X-PORTE

USER GUIDE

X-Porte

Ultrasound System

User Guide

Legal Notices

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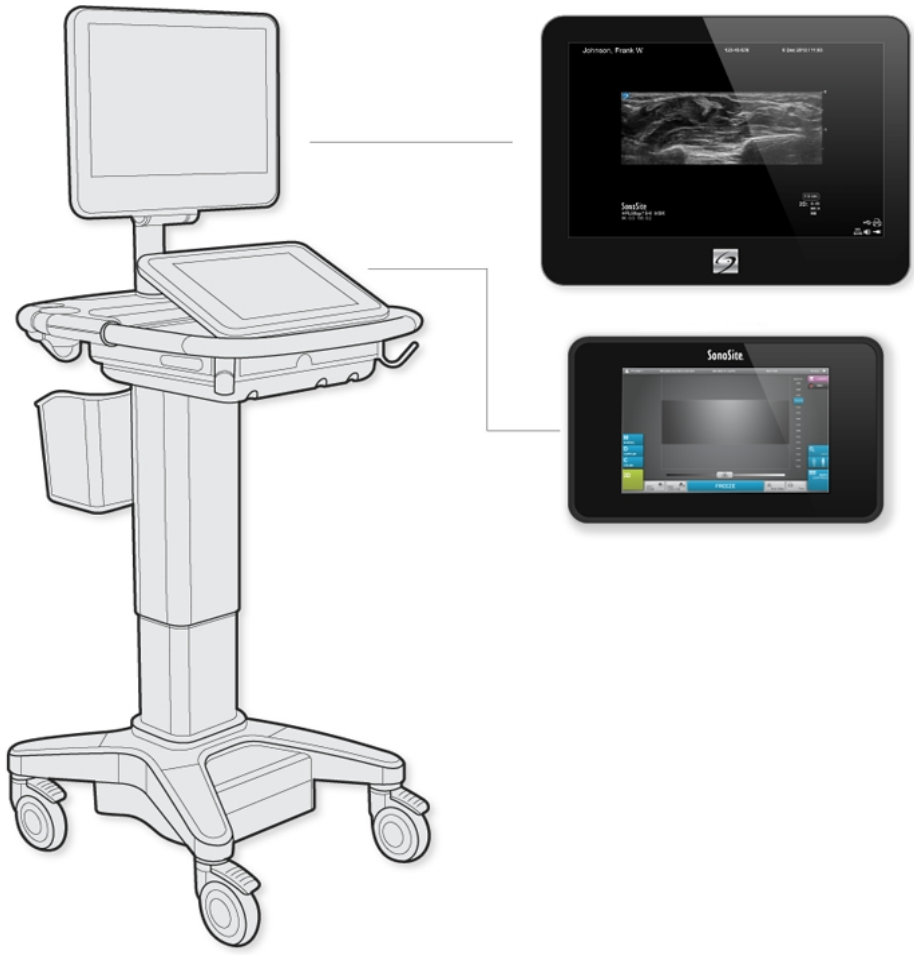
Welcome to the X-Porte User Guide



About the X-Porte User Guide

The *X-Porte User Guide* is intended for a user familiar with ultrasound. It does not provide training in sonography, ultrasound, or clinical practices. Before using the X-Porte ultrasound system, you must complete such training.

Document conventions

- "Warning" introduces precautions that prevent injury or death.
- "Caution" introduces precautions that prevent damage to the equipment.
- Numbered and lettered steps in procedures must be performed in order.
- Bulleted lists in procedures can be performed in any order.
- The step in a single-step procedure begins with ♦.

For a description of labeling symbols that appear on the product, see the *X-Porte Product Information & Safety Guide.*

Getting help

In addition to the *X-Porte User Guide*, the following are available:

- Visual Guide videos. See "Visual Guide videos" on page 25.
- *X-Porte Product Information & Safety Guide*.
- On-system version of the user guide: tap **MORE**, and then tap **Help**.
- *X-Porte Getting Started Guide*.
- Service manual.

- FUJIFILM SonoSite Inc.Technical Support:

Phone (U.S. or Canada)	(877) 657-8118
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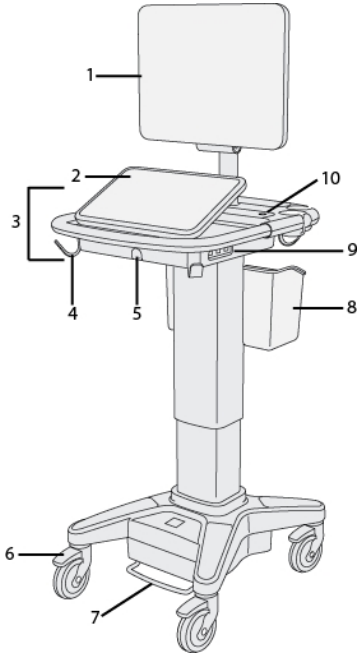
Getting started

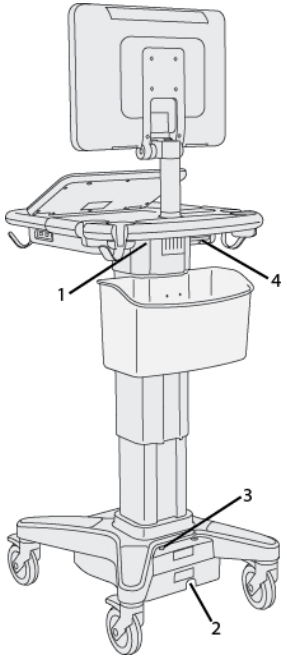
Warning: Do not use the system if it exhibits erratic or inconsistent behavior. Such behavior indicates a hardware failure. Contact FUJIFILM SonoSite Technical Support.

About the system

X-Porte is a portable, software-controlled device that acquires and displays high-resolution, real-time ultrasound images. Features available depend on your system configuration, transducer, and exam type.



X-Porte front view:
1. Clinical monitor, 2. Touch panel, 3. Platform, 4. Hook (4), 5. Transducer connector, 6. Locking wheel (4), 7. Height-adjustment pedal, 8. Basket, 9. USB ports (3), 10. Power button



X-Porte rear view :
1. Ports on dock (left side) 2. Power cord connector, 3. Battery charge indicator, 4. Ports on dock (right side)

A license key is required to activate the software. See the *X-Porte Product Information & Safety Guide*.

Basic operating steps

1 Connect a transducer. See "About transducers" on page 15.

2 Turn on the system. See "Turning on the system" on page 6.

3 Select the transducer and exam type (or use the default selections). See "Selecting a transducer and exam type" on page 20.

4 (Optional) Enter patient information. See "Entering patient information" on page 76.

5 Scan. See "Scanning" on page 110.

Turning on the system

Warning: Verify that the hospital supply voltage corresponds to the power supply voltage range.

Warning: Plug the system only into a grounded hospital-grade outlet.

Warning: Use only power cords provided by FUJIFILM SonoSite with the system.

Caution: Do not use the system if an error message appears on the clinical monitor. Note the error code and turn off the system. Call FUJIFILM SonoSite or your local representative.

Caution: When using AC power, position the system to allow easy access to disconnect it.

To turn on the system

The system can be powered by the internal battery or by AC power.

1 If you are operating the system using AC power, connect the AC power cord to the stand, and then connect the AC power cord to a hospital-grade outlet.

2 Press the power button.

The power button is green while the system is on, even if the system is in sleep mode (see "Power and Battery settings" on page 59).

To turn off the system

♦ Press the power button.

Clinical monitor

The clinical monitor displays the ultrasound image as well as details about the exam and system status.

Clinical monitor layout:

1. *Patient header*
2. *Measurement and calculation area*
3. *Selected transducer, exam type, and MI and TI values*
4. *Imaging mode or modes, controls selected*

5. *System status area*
6. *Depth scale*
7. *Ultrasound image*
8. *Orientation marker*

Touch panel

The touch panel is where you adjust settings; select the exam type, transducer, and imaging mode; enter patient information; and more. As you adjust the image settings or controls, the results appear on the clinical monitor. When an image is frozen, the touch panel displays an outline of the image.

You interact with the touch panel the same as with many other touchscreen devices:

- Swipe: Move your finger quickly across the panel. Faster than dragging.
- Drag: Move one or two fingers across the panel, usually to move an object from one location to another.
- Tap: Quickly touch the panel once; for example, to activate a control.
- Double-tap: Quickly touch the panel twice with one or more fingers.
- Pinch or spread: Slide two fingers together or apart on the panel.

Use these gestures to perform these actions:

Gesture	Action
Swipe	Steer D-line (linear transducers only)
	Steer color box (linear transducers only)
	Scroll through pages in forms, such as the patient form, worksheets, and thumbnails in Review
	Select previous or next images in full-screen Review
Drag	Adjust depth or gain
	Move color or zoom box
	Move calipers

Gesture	Action
	Move D-line or M-line
	Move Doppler baseline
	With two or more fingers, drag anywhere on the touch panel to move or resize the active object, such as the Color box or the Doppler gate.
	Move depth marker in biopsy guide
	Change the D-line angle selection
	Move labels, pictograms, and transducer marker
	Move through frames in the cine buffer
	Move controls to the Controls bar
	Pan a frozen zoomed 2D image (panning is disabled if measurements or labels exist on the frozen zoomed image)
	Unfreeze a frozen image by dragging the **Slide to Unfreeze** slider
Tap	Freeze
	Adjust depth
	Select calipers
	Select image in dual
	Select mode in split screen (2D, D-line, or Doppler trace)
Double-tap	With two or more fingers, double-tap to freeze or unfreeze
	Double-tap with one finger in the zoom box to zoom
	Double-tap with one finger on a live zoomed image to unzoom
Pinch or spread	Sample volume size
	Resize color or zoom box

Onscreen keyboard

You can enter text into text boxes (for example, on the patient form) using the onscreen keyboard.

To enter text using the onscreen keyboard

1 Tap a text box (for example, in the patient form).

The onscreen keyboard appears.

2 Tap keys as needed.

Onscreen keyboard:

1. *Alpha keys: Tap and hold the alpha keys to reveal options for selecting accented versions of the characters*
2. *Shift key: Changes alphabet keys to uppercase and international characters*
3. *Jumps to previous text box*
4. *Advances to next text box*
5. *Spacebar*
6. *Displays keys for numbers, symbols, and special characters*
7. *Closes the keyboard*
8. *Starts a new line or advances to next text box*
9. *Deletes character on left side of pointer*

Adjusting the height and angle

Warning: Lock the wheels whenever the system is unattended or stationary.

Warning: **To avoid possible injury from an unexpected clinical monitor collapse during system transport, collapse the clinical monitor before system transport (see "To collapse the clinical monitor" on page 11).**

To raise or lower the platform

♦ While pressing down the height-adjustment pedal, grasp both sides of the platform and push down or pull up to the desired height.

To lock a wheel

♦ Press down the lever on the wheel.

To unlock the wheel, press up on the bottom of the lever.

To adjust the clinical monitor angle

♦ Grasping the clinical monitor on both sides, tilt or rotate it.

To adjust the touch-panel angle

♦ Grasping the sides of the touch panel, pull it forward or push it backward to the desired angle.

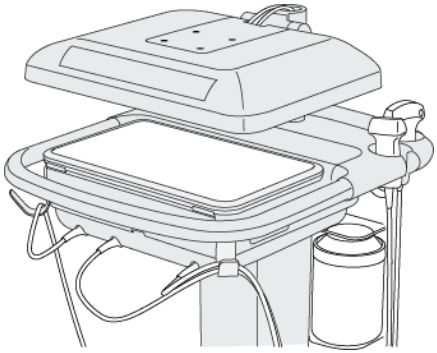
To collapse the clinical monitor

Always collapse the clinical monitor before system transport.

1 Adjust the touch panel angle to the lowest position.

2 Grasping the clinical monitor on both sides, align it squarely above the touch panel.

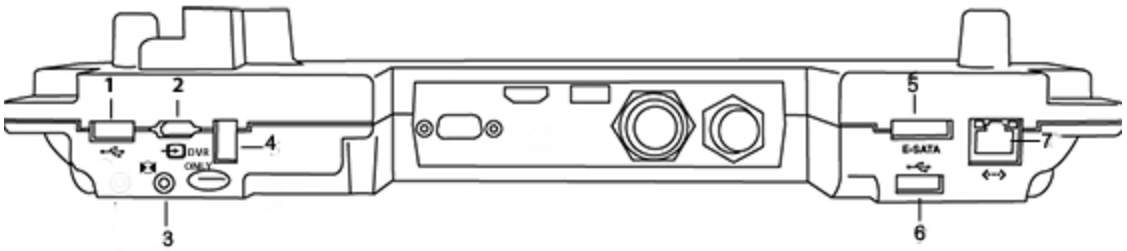
3 Fold the clinical monitor downward over the touch panel.



Clinical monitor collapsed for system transport

Ports

The system provides ports for USB, digital video-in, audio-in, DVR, E-SATA (unsupported), and Ethernet.



Ports on the dock

1. USB 2. Digital video-in 3. Audio in 4. DVR recording (USB) and upgrade 5.E-SATA (unsupported) 6. USB 7. Ethernet

Battery charge indicator

Warning: Connect the system to AC power when the battery charge is low.

Warning: **Periodically check to make sure that the battery charges fully. If the battery fails to charge fully, contact SonoSite Technical Support (see "Getting help" on page 3).**

Caution: **Use only FUJIFILM SonoSite batteries with the system.**

The battery charge indicator on the base of the stand blinks while the battery is charging. The battery charging indicator is steady when the battery is fully charged. Icons in the connectivity status area on the clinical monitor show the power and battery status:

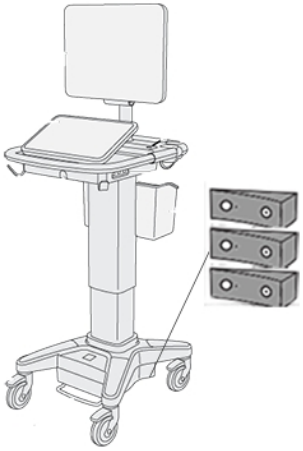
	The battery is partially charged. The length of the blue bar indicates the level of battery charge. If Beep Alert is on (see "Audio settings" on page 39), the system beeps when the battery charge is below 14%.
	The system is on AC power only, and no battery is installed.
	The system is on AC power, and the battery is charged. The length of the blue bar indicates the level of the battery charge.

Transporting the system

If you need to transport the system, make sure to observe the following:

- Collapse the clinical monitor. See "To collapse the clinical monitor" on page 11.
- To wheel the system, push forward on the bar on the platform platform instead of pushing downward on the bar or pushing the clinical monitor.

Caution: **Make sure to turn the battery switches to the Off position before transporting the system for shipping: Open the battery compartment door located at the base of the stand and turn the three battery switches to the Off position.**



Battery switches in off positions

Accessories and peripherals

The system supports various accessories and peripherals. See the *X-Porte Product Information & Safety Guide* for a list of compatible products.

About transducers

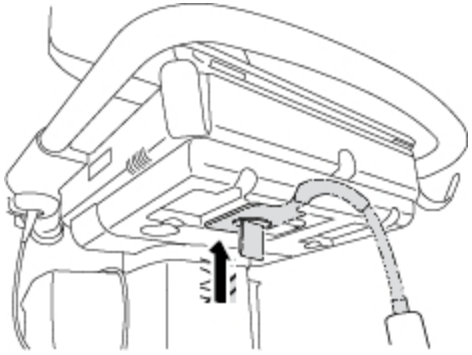
Connecting transducers

To connect a transducer to the TTC

The Triple Transducer Connect (TTC) is a three-transducer module that lets you simultaneously connect up to three transducers to the ultrasound system. The TTC is standard with the system.

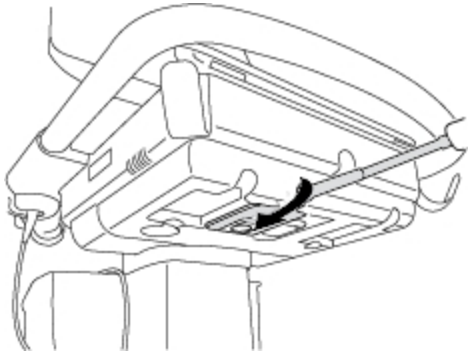
1 Pull the transducer latch handle up, and rotate it clockwise.

2 Insert the transducer connector into one of the three TTC connector ports on the bottom of the TTC.



3 Make sure that the connector is firmly seated, and then turn the latch handle counterclockwise.

4 Press the latch handle up, securing the transducer connector to the TTC.

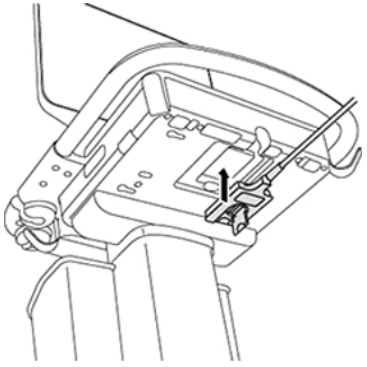


To connect a transducer to the system (without a TTC)

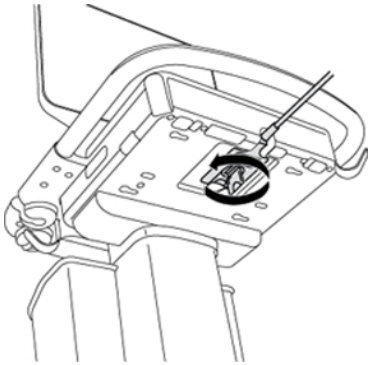
If the TTC is not installed on your system, you can connect one transducer directly to the system.

1 Pull the transducer latch up, and rotate it clockwise.

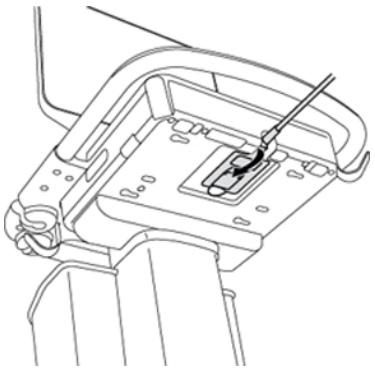
2 Insert the transducer connector into the transducer port underneath the stand platform.



3 Make sure that the connector is firmly seated, and then turn the latch handle counterclockwise.



4 Press the latch up, securing the transducer connector to the system.



Preparing transducers

Warning: **Some transducer sheaths contain natural rubber latex and talc, which can cause allergic reactions in some individuals. SonoSite recommends that you identify your latex and talc-sensitive patients and be prepared to treat allergic reactions promptly.**

Warning: **Some gels and sterilants can cause an allergic reaction on some individuals.**

Caution: **To avoid damage to the transducer, use only gels recommended by FUJIFILM SonoSite. Using other gels can damage the transducer and void the warranty. If you have questions about gel compatibility, contact FUJIFILM SonoSite or your local representative.**

Caution: **Clean transducers after each use. See the *X-Porte Product Information & Safety Guide*.**

Gel

Use acoustic coupling gel on the transducer during exams. Although most gels provide suitable acoustic coupling, some gels are incompatible with some transducer materials. FUJIFILM SonoSite recommends Aquasonic gel and provides a sample with the system.

For general use, apply a liberal amount of gel between the transducer and the body. For interventional use, apply a transducer sheath.

Sheaths

Warning: **Use market-cleared, sterile transducer sheaths and sterile coupling gel for transrectal, transvaginal, or guided-needle procedures. Do not apply the transducer sheath and coupling gel until you are ready to perform the procedure. After use, remove and discard the single-use sheath, and clean and disinfect the transducer using a FUJIFILM SonoSite-recommended high-level disinfectant.**

To apply a transducer sheath

1 Place gel inside the sheath. Make sure that the gel is at the end of the sheath.

2 Insert the transducer into the sheath.

3 Pull the sheath over the transducer and cable until the sheath is fully extended.

4 Secure the sheath using the bands supplied with the sheath.

5 Check for and eliminate air bubbles between the face of the transducer and the sheath.

Air bubbles between the face of the transducer and the sheath may affect the ultrasound image.

6 Inspect the sheath to ensure that there are no holes or tears.

Related topics

Intended uses 27
Selecting a transducer and exam type 20

Selecting a transducer and exam type

Warning: To prevent misdiagnosis or harm to the patient, use the correct transducer for the application. The diagnostic capability differs for each transducer, exam type, and imaging mode. Transducers are developed to specific criteria depending on their physical application. These criteria include biocompatibility requirements. Understand the system's capabilities prior to use.

Before scanning, you select a transducer and exam type.

To select a transducer and exam type

1 Do one of the following:

- On the start select screen, tap **SELECT** if present. (To set up the start select screen, see "User profile settings" on page 64.)
- Tap **TRANSDUCERS & EXAMS** at the top of the touch panel.

Cards for the available transducers appear (see "Connecting transducers" on page 15).

2 On the card for the appropriate transducer, do one of the following:

- Double-tap the exam type.
- Tap the exam type, and then tap **SCAN**, or tap **Cancel** to cancel.

Scrolling the list of exam types displays any hidden items.

You can also select the exam type on the patient form. See "Entering patient information" on page 76.

Imaging modes and exam types on transducers

		Imaging mode				
Transducer	Exam type	2D M Mode	CPD	Color	PW Doppler*	CW Doppler
C60xp	Abdomen	√	√	√	√	—
	Gynecology	√	√	√	√	—
	Musculoskeletal	√	√	√	√	—
	Nerve	√	√	√	√	—
	Obstetrics	√	√	√	√	—
HFL50xp	Breast	√	√	√	√	—
	Musculoskeletal	√	√	√	√	—
	Nerve	√	√	√	√	—
	Small Parts	√	√	√	√	—
ICTxp	Gynecology	√	√	√	√	—
	Obstetrics	√	√	√	√	—
L25xp	Musculoskeletal	√	√	√	√	—
	Nerve	√	√	√	√	—
	Superficial	√	√	√	√	—
	Arterial	√	√	√	√	—
	Venous	√	√	√	√	—
	Ophthalmic	√	√	√	√	—
L38xp	Nerve	√	√	√	√	—
	Small Parts	√	√	√	√	—
	Arterial	√	√	√	√	—
	Venous	√	√	√	√	—

Imaging modes and exam types on transducers

		Imaging mode				
Transducer	Exam type	2D M Mode	CPD	Color	PW Doppler*	CW Doppler
P21xp	Abdomen	√	√	√	√	—
	Cardiac	√	—**	√	√	√
	Lung	√	√	√	√	—
	Obstetrics	√	√	√	√	—

** For the cardiac exam type, PW TDI is also available.*

***The system uses Variance Color Doppler instead of CPD for the cardiac exam type on the P21xp transducer.*

Related topics

About transducers....15
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USB devices

You can use the USB ports on the system for connecting devices such as a USB printer or a USB memory stick. (For a list of supported devices, see the *X-Porte Product Information & Safety Guide*.)

The USB port at the back of the system labeled DVR Only is for DVR recording only. See "DVR recording " on page 309.

USB memory sticks

You can use a USB memory stick to export patient exams, import and export logs and setup configurations, and to import custom obstetric calculation tables.

Note: The system does not support password-protected USB memory sticks. Make sure that the USB memory stick you use does not have password protection enabled.

Caution: To avoid damaging the USB memory stick and losing patient data from it, observe the following:
· Do not remove the USB memory stick or turn off the ultrasound system while the system is exporting.
· Do not bump or otherwise apply pressure to the USB memory stick while it is in a USB port on the ultrasound system. The connector could break.

Caution: If the USB icon does not appear in the system status area on the clinical monitor, the USB memory stick may be defective or password-protected. Replace the USB memory stick.

To connect a USB memory stick for importing or exporting

♦ Insert the USB memory stick into a USB port (see "About the system" on page 5).

The USB memory stick is ready when the USB icon appears onscreen.

To view information about the device, see "USB settings" on page 70.

To disconnect a USB memory stick

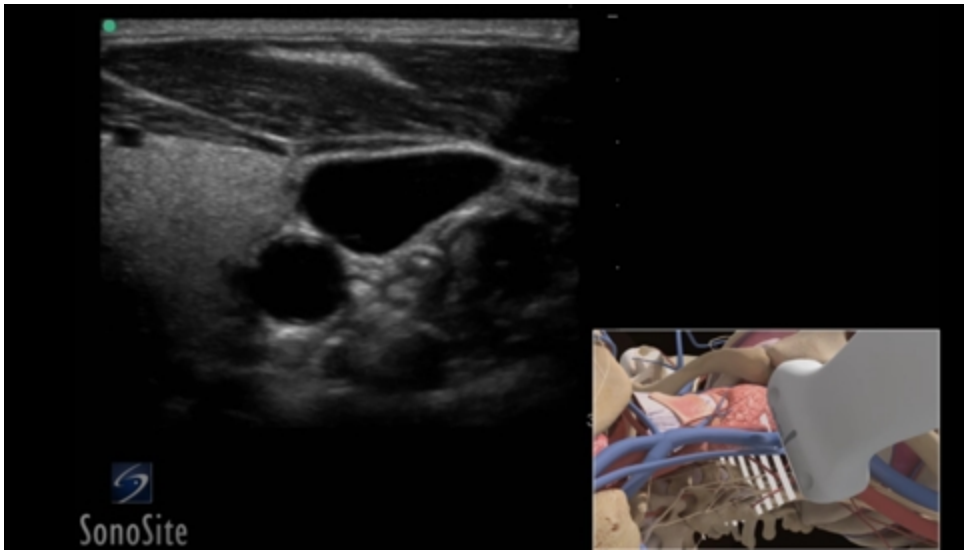
Disconnecting the USB memory stick while the system is exporting to it may cause the exported files to be corrupted or incomplete.

1 If exporting, wait at least five seconds after the USB animation icon stops.

2 Remove the USB memory stick from the port.

Visual Guide videos

The Visual Guide library contains animated 3D videos that describe scanning techniques, terminology, and more. Scanning is active while a video plays, so you can practice scanning techniques in conjunction with the visual guides.



A Visual Guide video

To play a Visual Guide video

1 Display the Visual Guide screen by doing one of the following:

- Tap **LEARN** on the startup screen.
- In the upper right corner of the touch panel, tap **LEARN**, or tap **MORE** and then tap **LEARN**, depending on your setup.

  To specify the location of this command, see "Presets settings" on page 60.

2 At the top of the Visual Guide screen, tap a category (for example, **Basics**).

The current selection is highlighted.

3 Tap a video selection in one of the cards that appear.

Tap the left and right controls to show additional cards.

The video player starts. Tap to play your selection.

4 Do any of the following:

- Restart or pause the video using the controls at the bottom of the player.
- Tap the volume control to mute the audio. (Tap again to unmute.)
- Drag the volume slider to adjust the volume.
- Tap **Hide** to hide the player. (You can tap **LEARN** to show the player again.)
- Tap another video in the list to play it.
- Tap **LEARN** to return to the Visual Guide screen.

Intended uses

The system is used with a transducer attached and is powered either by battery or by AC electrical power. The clinician is positioned beside the patient and places the transducer onto the patient's body where needed to obtain the desired ultrasound image.

The system transmits ultrasound energy into the patient's body to obtain ultrasound images as listed below.

For the intended transducer and imaging modes for each exam type, see "Selecting a transducer and exam type" on page 20.

Abdominal imaging applications You can assess the liver, kidneys, pancreas, spleen, gallbladder, bile ducts, transplanted organs, abdominal vessels, and surrounding anatomical structures for the presence or absence of pathology transabdominally. You can evaluate and perform interventional abdominal procedures and evaluate blood flow in abdominal organs.

Arterial and venous imaging applications You can assess the carotid arteries, deep veins, and arteries in the arms and legs, superficial veins in the arms and legs, great vessels in the abdomen, and various small vessels feeding organs for the presence or absence of pathology.

Cardiac imaging applications You can assess the cardiac valves, the great vessels, heart size, cardiac function, hemodynamic assessment, and surrounding anatomical structures for the presence or absence of pathology.

You can use the ECG option to display the patient's heart rate. (ECG is available only on the cardiac exam type on the P21xp transducer.)

Warning: To prevent misdiagnosis, do not use the ECG trace to diagnose cardiac rhythms. The FUJIFILM SonoSite ECG option is a non-diagnostic feature.

Gynecology and infertility imaging applications You can assess the uterus, ovaries, adnexa, and surrounding anatomical structures for the presence or absence of pathology transabdominally or transvaginally. You can assess blood flow in pelvic organs transabdominally and transvaginally.

Interventional department imaging applications You can use the system for ultrasound guidance in biopsy and drainage procedures, vascular line placement, peripheral nerve blocks, amniocentesis and other obstetrical procedures.

Obstetrical imaging applications You can assess the fetal anatomy, viability, estimated fetal weight, fetal heart rate, fetal position, gestational age, amniotic fluid, and surrounding anatomical structures for the presence or absence of pathology transabdominally or transvaginally.

You can evaluate the blood flow of the fetus, placenta, umbilical cord, and surrounding maternal structures.

Color Power Doppler (CPD) and Color Velocity Doppler (CVD) imaging tools are intended to evaluate the blood flow of the fetus, placenta, umbilical cord, and surrounding maternal structures in all cases, including high-risk pregnancies. High-risk pregnancy indications include, but are not limited to, multiple pregnancies, fetal hydrops, placental abnormalities, maternal hypertension, diabetes, and lupus. CPD and Color imaging tools are not intended as a sole means of diagnosis nor as a sole method of high-risk pregnancy screening.

Warning: CPD or Color images can be used as an adjunctive method, not as a screening tool, for the detection of structural anomalies of the fetal heart and as an adjunctive method, not as a screening tool, for the diagnosis of Intrauterine Growth Retardation (IUGR).

Warning: To prevent injury or misdiagnosis, do not use this system for Percutaneous Umbilical Blood Sampling (PUBS) or *in vitro* Fertilization (IVF). The system has not been validated to be proven effective for these two uses.

Small parts, breast, musculoskeletal, nerve, superficial, and lung imaging applications You can assess the breast, thyroid, testicle, lymph nodes, hernias, musculoskeletal structures, soft tissue structures, ophthalmic structures, and surrounding anatomical structures for the presence or absence of pathology. You can detect normal lung motion for the presence or absence of pathology. You can demonstrate blood flow in superficial anatomical structures.

You can use the system for ultrasound guidance in biopsy and drainage procedures, vascular line placement, and peripheral nerve blocks.

Warning: To avoid injury to the patient, use only an Ophthalmic exam type when performing imaging through the eye. The FDA has established lower acoustic energy limits for ophthalmic use. The system will not exceed these limits only if the Ophthalmic exam type is selected.

Contraindications

The X-Porte ultrasound system has no known contraindications.

Setting up the system

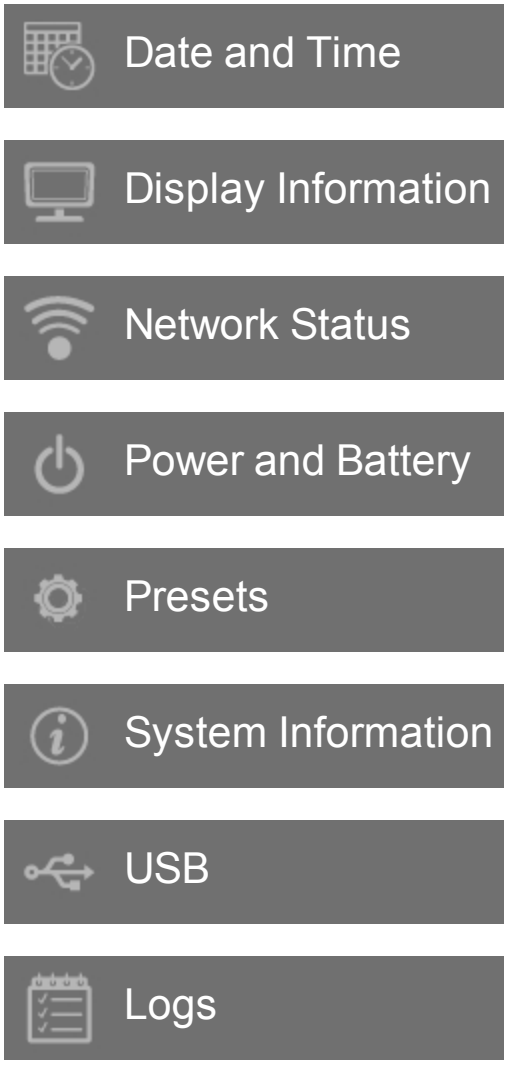
System Settings is where you customize the system and set preferences.

Note: Not all system settings are available if you log in to the system as a guest (see "Logging in " on page 37).

To display a settings page

- Tap **MORE**, and then tap **System Settings**.

Tapping a settings page in the list displays its settings on the right side. The active selection is highlighted.


Date and Time
Display Information
Network Status
Power and Battery
Presets
System Information
USB
Logs

Administration settings

On the Administration settings page, you can configure the system to require users to log in and enter passwords. Required login helps protect patient information. You can also add and delete users and change passwords.

To display the Administration Login settings page

1 Tap **MORE**, and then tap **System Settings**.

2 Tap **Administration** in the list on the left.

About security settings

Warning: Healthcare providers who maintain or transmit health information are required by the Health Insurance Portability and Accountability Act (HIPAA) of 1996 and the European Union Data Protection Directive (95/46/EC) to implement appropriate procedures: to ensure the integrity and confidentiality of information and to protect against any reasonably anticipated threats or hazards to the security or integrity of the information or unauthorized uses or disclosures of the information.

The Administration settings page includes security settings that help you to meet the applicable security requirements listed in the HIPAA standard. Users are ultimately responsible for ensuring the security and protection of all electronic protected health information collected, stored, reviewed, and transmitted on the system.

Managing the Administrator account

To log in as Administrator

The default Administrator login name is `Administrator`. If you don't have the administrator password, contact FUJIFILM SonoSite. (See "Getting help" on page 3.)

Any user with administrative privileges can log in as an administrator.

1 On the Administration Login settings page, type the login name of a user with administrative privileges in the **Name** text box.

2 Type the password for the login name in the **Password** text box.

3 Tap **Login**.

To log out as Administrator

♦ Do one of the following:

- Tap any other settings page.
- Turn off or restart the system.

To change the administrator password

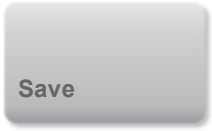
1 On the Administration Login settings page, log in as a user with administrative privileges.

2 Under **User List**, tap **Administrator**.

3 Type the new password in the **Password** text box and in the **Confirm** text box.

To ensure security, choose a password that contains uppercase characters (A-Z), lowercase characters (a-z), and numbers (0-9). Passwords are case-sensitive.

4 Tap **Save**.



Protecting patient information

To require user login

You can set the system to require a user name and password at startup. If you require user login, you also need to set up user accounts. (See "Adding and managing user accounts" on page 34.)

1 On the Administration Login settings page, log in as a user with administrative privileges.

2 Select **On** from the **User Login** list.

3 Tap **Done**.

To hide patient information

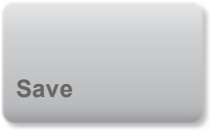
You can choose not to display the patient name and ID number on the clinical monitor and to remove it from exported images and video clips.

1 On the Administration Login settings page, log in as a user with administrative privileges.

2 Tap **Administrator** in the **User List**.

3 Select **Disable Patient Header**.

4 Tap **Save**.



To disable export and recording of patient data

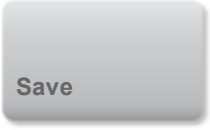
You can prevent users from exporting patient data to USB memory sticks and from recording video displayed on the clinical monitor to a USB memory stick inserted in the DVR (see "DVR recording " on page 309).

1 On the Administration Login settings page, log in as a user with administrative privileges.

2 Tap **Administrator** in the **User List**.

3 Select **Disable USB Export**.

4 Tap **Save**.



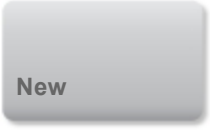
Adding and managing user accounts

You can add up to 20 user accounts (including the default Administrator account).

To add a new user

1 On the Administration Login settings page, log in as a user with administrative privileges.

2 Tap **New**.



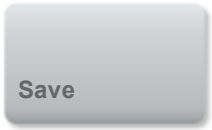
3 Under **User Information**, fill in the **Name**, **Password**, and **Confirm** text boxes.

To ensure security, choose a password that contains uppercase characters (A-Z), lowercase characters (a-z), and numbers (0-9). Passwords are case-sensitive.

4 (Optional) In the **User** box, type the user's name. This information appears by default in the **User** field in the patient form and on the clinical monitor.

5 (Optional) Select **Administration Access** to allow access to all administration privileges.

6 Tap **Save**.



7 Tap **Done**.

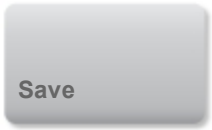
To modify a user

1 On the Administration Login settings page, log in as a user with administrative privileges.

2 Under **User List**, select the user.

3 Make changes to the **Name**, **User**, or **Administration Access** entries.

4 Tap **Save**.



5 Tap **Done**.

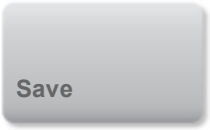
To change a user password

1 On the Administration Login settings page, log in as a user with administrative privileges.

2 Under **User List**, select the user.

3 Type the new password in the **Password** and **Confirm** text boxes.

4 Tap **Save**.



5 Tap **Done**.

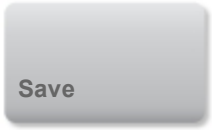
To allow users to change their password

1 On the Administration Login settings page, log in as a user with administrative privileges.

2 Under **User List**, tap **Administrator**.

3 Select **Password Changes**.

4 Tap **Save**.



5 Tap **Done**.

To delete a user

1 On the Administration Login settings page, log in as a user with administrative privileges.

2 Select the user under **User List** .

3 Tap .

4 Tap **Yes**.

5 Tap **Done**.

Logging in

If user login is required, the user login screen appears when you turn on the system. (See "To require user login" on page 33.)

To log in as a user

1 Turn on the system.

2 In the login screen, type your user name and password, and then tap **OK**.

To log in as guest

Guests can scan, save images and clips, view worksheets, and access Help and Visual Guide videos. Guests cannot access patient information or system settings (except **Monitor Brightness** and **Touch Panel Brightness**).

When you log in as a guest, the system always displays the 2D imaging screen, no matter which startup mode is specified in User Profile settings (see "User profile settings" on page 64).

1 Turn on the system.

2 In the login screen, tap **Guest**.

To change your password

You can change your password only if the administrator has enabled password changes. See "To allow users to change their password" on page 36.

1 Turn on the system.

2 In the login screen, tap **Change Password**.

3 Type your old and new passwords, confirm the new password, and then tap **Change**.

Related topics

Setting up the system 29

Audio settings

On the Audio settings page, you can specify sound settings and adjust the volume for beeps and clicks.

To display the Audio settings page

1 Tap **MORE**, and then tap **System Settings**.

2 Tap **Audio** in the list on the left.

To specify sound settings

♦ On the Audio settings page, do either or both of the following:

- Select **Button Clicks** for keys to click when tapped.
- Select **Beep Alert** for the system to play sounds.

To adjust the volume for beeps and clicks

♦ On the Audio settings page, drag the **Beeps and Clicks Volume** slider. To mute the volume for Beeps and Clicks, tap . To restore volume, tap .

Related topics

Saving images and video clips....178
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Calculations settings

On the Calculations settings page, you can specify measurement names that appear in the Tissue Doppler Imaging (TDI) calculations list and in the reports for cardiac exams.

You can select authors for obstetrics calculation tables and import custom obstetrics calculation tables.

You can also set up obstetrics custom measurements that appear in the obstetrics calculations lists and in the report for obstetrics exams.

To display the Calculations settings page

1 Tap **MORE**, and then tap **System Settings**.

2 Tap **Calculations** in the list on the left.

Cardiac calculations settings

To specify cardiac measurement names

1 On the Calculations settings page, tap **Cardiac**.

2 Under **TDI Walls**, select a name for each wall.

3 Tap **Done**.

Obstetrics calculations settings

Specifying gestational age and growth analysis

To specify gestational age and growth analysis

1 On the Calculations settings page, tap **OB**.

2 Select the desired authors (or select **None**) in the measurement lists under **Gestational Age** and **Growth Analysis**.

Selecting a gestational age author places the associated measurement in the calculations list.

3 To reset the authors for the **Gestational Age** and **Growth Analysis** measurement lists to the factory default, tap **Reset**.

Creating custom obstetrics measurements

You can create up to five custom measurements that appear in the obstetrics calculations lists, in the list of custom measurements in Calculations settings, and in the obstetric report.

You can create custom measurements on the system or in the X-Porte OB Custom Table Editor, a Microsoft Excel file available at www.sonosite.com. You can associate table data with a custom measurement only if you create the measurement in the OB Custom Table Editor.

Warning: **When you create, remove, or import a custom obstetric measurement, the system clears all saved measurements and calculations for the current patient.**

To create custom obstetrics measurements on the system

1 End the current exam.

2 On the Calculations settings page, tap **OB**.

3 In the **OB Custom Measurements** area, tap **Add New**.

4 In the **Name** box, type a unique name.

5 In the **Type** list, select the desired measurement type.

6 Tap **Save**.

To create custom obstetrics measurements in the OB Custom Table Editor

Before you use the OB Custom Table Editor, make sure that your system meets the minimum requirements for the editor and specify the language for the editor (see "Setting up custom obstetric tables " on page 44).

Note: The language of the OB Custom Table Editor must match the language of the X-Porte system on which you import the measurements.

1 On the **Setup-First** tab of the OB Custom Table Editor, click the Age-User Table to which you want to add a measurement.

2 In the **Measurement Name** cell, type a unique name of up to six characters.

Note: If you create a custom measurement with a name that matches the name of a custom measurement already on the system, the system overwrites the custom measurement on the system with the new custom measurement when you import it.

3 In the **Measurement Type** cell, select the desired measurement type.

4 Enter table data.

Once you've created custom measurements in the custom table editor, you can export the editor to a USB memory stick and then import the custom measurements from the editor onto the system (see "Exporting and importing custom obstetric tables and measurements" on page 45).

To delete a custom obstetric measurement

1 End the current exam.

2 On the Calculations setup page, tap **OB**.

3 In the **OB Custom Measurements** area, tap next to the measurement you want to delete.

4 Tap **Yes** to confirm the deletion.

The measurement and its associated table is removed from the system.

Viewing obstetric calculation tables

You can view obstetric calculation tables on the system, including tables you've imported using the OB Custom Table Editor.

You cannot modify or delete default (system-defined) obstetric calculation tables.

To view obstetric calculations tables

1 On the Calculations setup page, tap **Tables**.

2 Select the desired table type and measurement/author.

Setting up custom obstetric tables

You can use the X-Porte OB Custom Table Editor, a Microsoft Excel file available at www.sonosite.com, to set up custom obstetric gestational age and growth analysis tables.

After you enter custom tables in the editor, you export the tables to a USB memory stick and then import the tables onto the X-Porte system. (See "Exporting and importing custom obstetric tables and measurements" on page 45.)

Before you use the X-Porte OB Custom Table Editor, make sure that your computer meets the following minimum requirements:

Windows

- Windows Vista, 32-bit or 64-bit, or later
- Microsoft Excel 2007 or later, configured to enable all macros and to trust access to the VBA project object model (see Excel Help for instructions).

Mac OS

- Mac OS X 10.5 (Leopard) or later
- Microsoft Excel 2011 or later

To specify the language of the OB Custom Table Editor

♦ On the **Setup-First** tab in the editor, select a language from the **Please Specify Language** list.

The language selected must match the language of the X-Porte system on which you import the tables.

To set up custom obstetric tables in the OB Custom Table Editor

You can set up custom tables of up to 120 entries (age tables) or 210 entries (growth tables).

Entries in the table editor cannot be negative and cannot contain slashes, asterisks, brackets, commas, or semicolons.

Warning: Prior to use, verify that custom table data entries are correct. The system does not confirm the accuracy of the custom table data that you enter.

1 Open the editor in Excel.

2 (Mac OS only) Click **Enable Macros**.

3 On the **Setup-First** tab, click the Growth or Age table that you want to edit.

4 Enter a unique name with a maximum of 24 characters in the **Author** field. You cannot use author names that occur in system-defined OB calculation tables.

5 Do one of the following:

- (Growth tables) Enter values in the **Weeks**, **Min**, **Mid**, and **Max** fields.

  Values in the **Weeks** column must increase.

- (Age tables) Enter values in the **Value**, **Age (weeks) Age (days)**, **Range (weeks)**, and **Range (days)** fields.

  Values in the **Value** column and the totals of the values in the **Age (weeks)** and **Age (days)** columns must increase.

A graphical representation of the values you enter appears to the right of the cells in each tab.

6 Save the data.

Exporting and importing custom obstetric tables and measurements

To export custom obstetric tables and measurements from the OB Custom Table Editor

When you export custom tables from the editor, all content from all tabs, including custom measurements, is included in the exported CSV file.

1 Insert a USB memory stick into your computer.

2 Click **Export** on any tab in the editor.

3 In the **Please Select the Export File Folder** window, navigate to the USB memory stick and click **OK**. You cannot change the file name of the exported file.

Note: Do not modify the exported CSV file. The system will not import data from the CSV file if the file has been modified.

To import custom obstetric tables and measurements

On import, the system updates the custom tables and custom measurements.

Warning: When you create, remove, or import a custom obstetric measurement, the system clears all saved measurements and calculations for the current patient.

Warning: Prior to use, verify that custom table data entries are correct. The system does not confirm the accuracy of the custom table data entered by the user.

1 End the current exam.

2 Insert the USB memory stick that contains the exported CSV file into a USB port on the side of the system.

3 On the Calculations settings page, tap **Tables**.

4 Tap **Import**.

5 Select the USB memory stick that contains the CSV file, and then tap **Import**.

The system restarts.

Deleting custom obstetric tables

You cannot delete system-defined obstetric tables.

1 On the Calculations settings page, tap **Tables**.

2 Select **Gestational Age** or **Growth Analysis**, and then select the **Measurement** and **Author** for the table you want to delete.

3 Tap **Delete**.

Related topics

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Obstetrics calculations 250
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CDA Report settings

When you select **Include CDA** on the DICOM **Archivers** configuration page, the ultrasound system archives the patient report in DICOM Encapsulated CDA (Clinical Document Architecture) format using the profile you specify on the CDA Report settings page.

Some CDA report settings appear in the patient report (see "Displaying reports and worksheets after the exam has ended" on page 292). For example, the **Custodian/Provider Organization Name** appears in the report's banner.

You can configure up to four CDA profiles on the system.

To display the CDA Report settings page

1 Tap **MORE**, and then tap **System Settings**.

2 Tap **CDA Report** in the list on the left.

To configure a CDA profile

Required fields are marked with asterisks.

1 On the CDA Report settings page, tap **Config**.

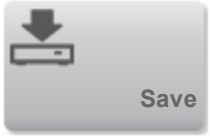
2 On the CDA Report page, tap **New**.

3 To change the profile name, type a new profile name in the **System/Author ID** box. Each profile name must be unique.

4 Complete the fields in the **Custodian/Provider Organization** and **Author/Authenticator Organization** sections.

5 To enter information about the authenticator, select **Include?** in the **Authenticator** section and complete the fields in the **Authenticator** section.

6 Tap **Save**.



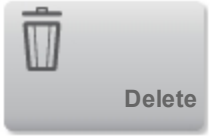
To specify a CDA profile

♦ On the CDA Report settings page, select a profile from the **Active Configuration** list.

To delete a CDA profile

1 On the CDA Report settings page, tap **Config**.

2 Select the CDA profile you want to delete in the **CDA List**, and tap **Delete**.



Related topics

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Connectivity settings

On the Connectivity settings page, you specify the system location, and specify options for alerts when internal storage is full. You can also import and export connectivity settings.

You can also manage wireless certificates and specify settings for DICOM, which is an optional feature. See "DICOM" on page 87.

To display the Connectivity settings page

1 Tap **MORE**, and then tap **System Settings**.

2 Tap **Connectivity** in the list on the left.

To specify the system location

The location you specify in Connectivity settings represents the active location of the system.

- On the Connectivity settings page, select a location from the **Location** list.

To receive storage alerts

- On the Connectivity settings page, select **Internal Storage Capacity Alert**.

  The system displays a message if internal storage is near capacity when you end an exam.

Importing and exporting connectivity settings

You can import and export all location and connectivity settings from and to another X-Porte system. These settings include DICOM configuration data for locations, wireless settings, archivers, printers,

storage commit servers, worklist servers, and MPPS servers.

The system does not import IP addresses or AE titles when you import configuration data from another system.

Caution: To avoid losing data from or damaging the USB memory stick, do not remove the USB memory stick or turn off the ultrasound system while exporting. In addition, do not bump or apply pressure to the USB memory stick while it is connected to the system. The connector could break.

To import connectivity settings

1 Connect the USB memory stick that contains the settings (see "USB devices" on page 23).

2 On the Connectivity settings page, tap **DICOM Setup.**

3 Tap **Config**.

4 Tap **Import**.

5 Select the USB memory stick, and then tap **Import**.

The system restarts. All configurations on the system are replaced with imported data.

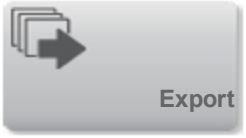
To export connectivity settings

1 Connect a USB memory stick (see "USB devices" on page 23).

2 On the Connectivity settings page, tap **DICOM Setup**.

3 Tap **Config**.

4 Tap **Export**.



5 Select the USB memory stick, and then tap **Export**.

All configurations on the USB memory stick are replaced with exported data. Five seconds after the exporting completes, you can safely remove the USB memory stick and use it to import the data onto another X-Porte system.

Related topics

Entering patient information 76
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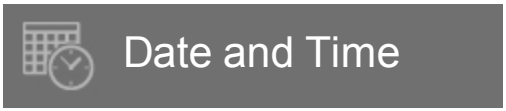
Date and Time settings

Warning: To obtain accurate obstetrics calculations, an accurate date and time are critical. Verify that the date and time are accurate before each use of the system.

To display the Date and Time settings page

1 Tap **MORE**, and then tap **System Settings**.

2 Tap **Date and Time** in the list on the left.



To set the date and time

♦ On the Date and Time settings page, do the following:

- In the **Date** boxes, type the current year, month, and day.
- In the **Time** boxes, type the current time in hours and minutes.
- To obtain the system time from a time server, select **Use Time on Time Server** and enter the **Server Address**. These options are available only if the DICOM licensed feature is enabled on the system.

  Note: If you select **Use Time on Time Server***, you cannot edit the* **Date** *and* **Time***. If you want to edit the* **Date** *and* **Time***, deselect* **Use Time on Time Server** *first.*

- To specify that the system automatically adjusts for daylight savings time changes, select **Daylight Savings Time**. This option is available only if you select **Use Time on Time Server**.
- Select your time zone from the **Time Zone** list.

Related topics

Setting up the system 29

Display Information settings

On the Display Information settings page, you can specify which details appear on the clinical monitor during imaging.

To display the Display Information settings page

1 Tap **MORE**, and then tap **System Settings**.

2 Tap **Display Information** in the list on the left.

To specify details that appear on the clinical monitor

♦ On the Display Information settings page, select settings in the following sections:

Patient Header Information that appears in the patient header, including the **Patient Name**, **Patient ID**, **Department ID**, **User**, **Institution**, and **Date and Time**.

Mode Data Imaging information for **2D**, **Doppler**, **Color**, or **M Mode**.

Related topics

Setting up the system 29

Network Status settings

The Network Status settings page displays information on system IP address, location, subnet mask, default gateway, and the Ethernet MAC address.

To display the Network Status settings page

1 Tap **MORE**, and then tap **System Settings**.

2 Tap **Network Status** in the list on the left.

Related topics

Connectivity settings 51
DICOM 87
Setting up the system 29

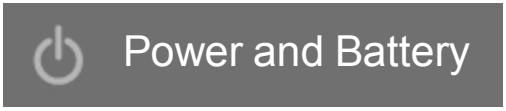
Power and Battery settings

On the Power and Battery settings page, you can specify the period of inactivity before the system goes into sleep mode or turns off.

To display the Power and Battery settings page

1 Tap **MORE**, and then tap **System Settings**.

2 Tap **Power and Battery** in the list on the left.



To specify power settings

♦ On the **Power and Battery** settings page, select from the following lists:

- **Sleep Delay** Select **Off**, or **5** or **10** minutes to specify the period of inactivity before the system goes into sleep mode.

  The system will automatically turn off if it is in sleep mode and the battery charge level drops below 14%.

  Note: The system will not sleep if you are in Procedure mode (see "Controls in 2D" on page 131) or if the system is archiving or exporting exams.

- **Power Delay** Select **Off**, or **15** or **30** minutes to specify the period of inactivity before the system automatically turns off.

Related topics

Setting up the system 29

Presets settings

The Presets settings page has settings for general preferences, brightness, labels, exam types, and user profile settings. You can export and import these settings.

To display the Presets settings page

1 Tap **MORE**, and then tap **System Settings**.

2 Tap **Presets** in the list on the left.

General preferences

To set general preferences

♦ On the Presets settings page, select from the following lists:

Note: Changing **Doppler Scale** *or* **Units** *clears all measurements and calculations for the current exam.*

- **Doppler Scale** Select **cm/s** or **kHz**.
- **Thermal Index TIS**, **TIB**, or**TIC**. The default setting is based on exam type: OB exam is **TIB**, and all others are **TIS**.
- **Units** Units for patient height and weight in cardiac exams: **in/ft/lbs** or **cm/m/kg**.
- **Auto Save Patient Form** When this option is on, the system saves the patient form as an image in the patient's exam.

Brightness

You can adjust the brightness of the clinical monitor or the touch panel to compensate for the level of light in the room in which the system is located.

To adjust brightness

♦ Do either or both of the following on the Presets settings page:

- Drag the **Monitor Brightness** slider. The range is **0**-**10**.
- Drag the **Touch Panel Brightness** slider. The range is **2**-**10**.

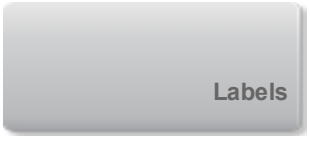
Labels

You can customize predefined labels, create new labels, delete labels, and set the preference for clearing labels when unfreezing images.

To manage predefined labels

Each exam type supports up to 35 predefined labels.

1 On the Presets settings page, tap **Labels**.

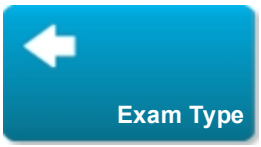


2 Tap an exam type and do any of the following:

- To customize a label, tap it and edit the text in the text box at the top of the form. Tap **Apply**.

- To create a new label, tap an empty label, and type the new label in the text box. Tap **Apply**.
- To delete a label, tap the **X** next to the label.
- To reset labels to the factory default, tap **Reset**.

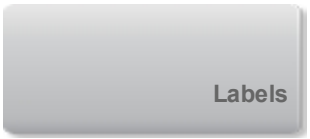
- To select a new exam type, tap **Exam Type.**



To specify label retention when unfreezing

You can specify that all labels be cleared from an image when you unfreeze the image.

1 On the Presets settings page, tap **Labels**.



2 Select **Clear Labels on Unfreeze**.

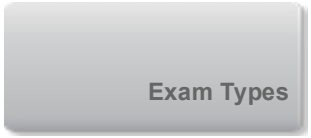
Exam types

The system displays both system-defined and user-defined exam types, organized by transducer.

You cannot share user-defined exam types among transducers.

To manage exam types

1 On the Presets settings page, tap **Exam Types**.



2 Tap the transducer that includes the exam type you want to manage.

Note: If the transducer that includes the exam type you want to manage does not appear, make sure that the transducer is connected to the system.

3 Do any of the following:

- (User-defined exam types only) To rename the exam type, tap the exam type name and type a new name.
- (User-defined exam types only) To delete the exam type, tap .
- To show or hide the exam type in the transducer & exam types list, tap the check box next to the exam type in the column.
- To rearrange the exam type, tap it and then tap **Up** or **Down**.
- To return to the transducer and exam types list, tap **Transducer**.

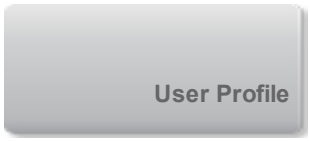
4 Tap **Done**.

User profile settings

To specify a startup mode

You can specify what mode the system will be in when you start it, end an exam, or log in.

1 On the Presets settings page, tap **User Profile**.



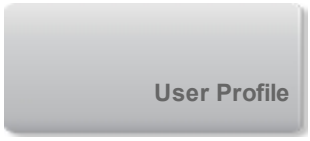
2 Select an option in the **Startup** section:

- **Start Select Screen** Displays the home screen, which offers you the option of scanning, entering patient information, select a transducer and exam type, or viewing visual guides.
- **Scanning** Displays the 2D imaging screen.
- **Transducer/Exam Select** Displays the options for selecting transducers and exam types.
- **Patient Info** Displays the patient form.

To automatically query the worklist from a bar code scanner

You can specify that the system query the worklist for patient information when you scan a patient ID bar code.

1 On the Presets settings page, tap **User Profile**.

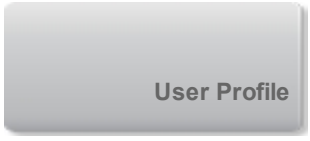


2 Select **Bar Code Auto Query**.

To program the footswitch

You can specify the function of the left and right footswitches: **None**, **Save Video Clip**, **Record**, **Freeze**, **Save Image**, or **Print**.

1 On the Presets settings page, tap **User Profile**.



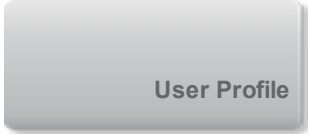
2 Select options from the **Footswitch (L)** and **Footswitch (R)** lists.

To configure custom controls

By default, the four controls that appear next to the **Freeze** control in live imaging are **Auto Gain**, **Save Image**, **Save Video Clip**, and **End Exam**.

You can specify the function of these controls.

1 On the Presets settings page, tap **User Profile**.



2 Select options from the **Program Control A**, **Program Control B**, **Program Control C**, and **Program Control D** lists.

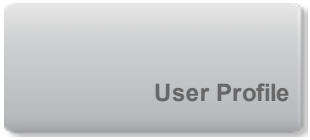
The selected options for **Program Control A** and **Program Control B** appear to the left of the Freeze control on the touch panel. The selected options for **Program Control C** and **Program Control D** appear to the right of the Freeze control on the touch panel.

To reset controls

You can reset the More Controls window to the factory default.

If you have moved controls from the More Controls window to the Controls bar, resetting the controls removes them from the Controls bar. Similarly, resetting the controls moves controls you have moved from the Controls bar to the More Controls window.

1 On the Presets settings page, tap **User Profile**.

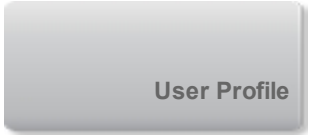


2 Tap **Reset More Controls**.

To show or hide the Learn button

You can specify that the system hide the Learn button on the touch panel. If you hide the Learn button, you can still access the visual guides by selecting **Learn** from the **More** menu.

1 On the Presets settings page, tap **User Profile**.



2 Deselect **Show Learn Button**.

Importing and exporting

When you import or export from the Presets settings page, you import and export all labels, exam types, user accounts, and system settings, except for connectivity settings.

To import or export

When you import from the Presets settings page, all system preferences on the system are replaced with the imported preferences. When you export from the Presets settings page, all system preferences on the USB memory stick are replaced with the exported preferences.

1 Insert a USB memory stick.

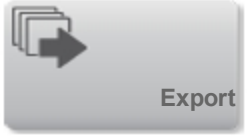
2 On the Presets settings page, do either of the following:

- To import labels, exam types, user accounts, and system settings, tap **Import**, and then tap **Yes**.

  Select the desired USB memory stick, and then tap **Import**.

  All labels, exam types, user accounts, and system settings are replaced with those from the USB memory stick.

- To export labels, exam types, user accounts, and system settings, tap **Export**, and then tap **Yes**.

  Select the desired USB memory stick, and then tap **Export**.

A copy of all labels, exam types, user accounts, and system settings saves to the USB memory stick. Passwords for user accounts are encrypted.

Related topics

Labeling images 194
Setting up the system 29
Imaging controls 129

System Information settings

The System Information settings page displays system hardware and software versions, patents, and license information.

See also "Software licensing" in the *X-Porte Product Information & Safety Guide*.

To display the System Information settings page

1 Tap **MORE**, and then tap **System Settings**.

2 Tap **System Information** in the list on the left.

Related topics

Setting up the system 29

USB settings

On the USB settings page, you can view information about connected USB devices, including space availability.

You can also specify a file format and options for images and video clips in patient exams that you export to a USB memory stick, and you can enable automatic export of ended exams.

To display the USB settings page

1 Tap **MORE**, and then tap **System Settings**.

2 Tap **USB** in the list on the left.

To specify export options

1 On the USB settings page, select an **Export Type**:

- **DICOM Export** creates DICOMDIR files readable by a DICOM reader. DICOM is an optional feature.
- **Multimedia Export** organizes files in a standard folder structure. Video clips export in MJPEG video saved as AVI. To view them, FUJIFILM SonoSite recommends Windows Media Player or QuickTime 7.0 or later.

2 Select an **Image Format** for your export type. For JPEG image format, also select a JPEG compression. A high compression has a smaller file size but less detail. (See "Limitations of JPEG format" on page 71.) The image format affects both still images and video clips.

For optimal DICOM image quality, select RGB image format and low compression.

3 (**Multimedia Export** only) Select a sort order from the **Sort By** list.

4 Select **Auto Export** to enable automatic export of ended exams. See also "To export patient exams automatically to a USB memory stick " on page 308.

5 (**DICOM Export** only) Select any of the following:

- **Include eFilm Lite** to include a copy of the eFilm Lite image-viewer with exams that you export to a USB memory stick. See "eFilm Lite image-viewer" on page 71.
- **Include CDA** to export the CDA report. See "CDA Report settings" on page 48.
- **Include SR** to export the Structured Report.

6 Tap **Done**.

Limitations of JPEG format

When transferring or exporting images in JPEG format, the system uses *lossy compression.* Lossy compression may create images that have less absolute detail than BMP format and that don't render identically to the original images.

In some circumstances, lossy-compressed images may be inappropriate for clinical use.

For more information on using lossy-compressed images, consult the industry literature.

eFilm Lite image-viewer

You can include a copy of the eFilm Lite image-viewer with exams that you export to a USB memory stick in DICOM format (see "To specify export options " on page 70). eFilm Lite lets you view DICOM-formatted images on a computer running Windows.

eFilm Lite is included with the DICOM licensed feature.

To start eFilm Lite image-viewer after exporting exams

1 Insert the USB memory stick into your computer.

2 Display the USB memory stick's contents.

3 Double-click **eFilmLite.bat**.

eFilmLite.bat starts the executable file in the eFilmLite folder. The eFilmLite folder contains the eFilm Lite software and related files. See also the *eFilm Lite User's Guide,* a PDF file in the eFilmLite folder.

Related topics

USB devices 23
Archiving and exporting 303
Setting up the system 29

Logs

On the Logs settings page, you can view the following logs:

- **User** Collects information about user logins and user creation, as well as information about when the log was exported or cleared.
- **DICOM** Collects network errors and events, typically to support diagnostics (see "DICOM" on page 87).
- **Assert** Collects processor exceptions and software-generated assertions to support diagnostics. The assert log is visible only to users with administrative privileges.
- **System** Collects errors and events to support diagnostics. The system log is visible only to users with administrative privileges.

The logs are text files that you can open in a text-editing application (for example, Notepad or TextEdit).You can export the logs to a USB memory stick and read them on a PC.

Log contents are saved as entries are generated. The logs have limited space and overwrite existing content when full.

To display the Logs settings page

1 Tap **MORE**, and then tap **System Settings**.

2 Tap **Logs** in the list on the left.

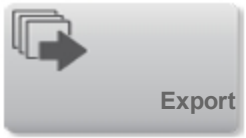
To export a log

Caution: To avoid losing data from or damaging the USB memory stick, do not remove the USB memory stick or turn off the ultrasound system while exporting. In addition, do not bump or apply pressure to the USB memory stick while it is connected to the system. The connector could break.

1 Connect a USB memory stick (see "USB devices" on page 23).

2 On the Logs settings page, tap the log.

3 Tap **Export** .



A list of USB devices appears.

4 Select the appropriate USB memory stick, and tap **Export**.

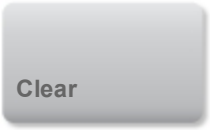
5 Tap **Yes** to confirm the export.

Five seconds after the exporting completes, you can safely remove the USB memory stick.

To clear a log

1 On the Logs settings page, tap the log.

2 Tap **Clear** to delete all text.



3 Tap **Yes** to confirm the deletion.

Related topics

DICOM 87
Setting up the system 29

Entering patient information

The patient form lets you enter identification, exam, and clinical details for the patient exam. This information appears in the patient report.

After you begin a new patient form, all images, video clips, and other information you save during the exam are linked to that patient.

You can enter patient information by:

- Entering the information manually. (See "To enter patient information manually" on page 76.)
- Importing information from a DICOM worklist server. (See "To enter patient information from the worklist" on page 80.)
- Scanning a patient bar code and obtaining patient information from a worklist server. (See "To enter patient information from the worklist with a bar code scanner" on page 80.)
- Scanning a patient bar code to obtain the patient **ID** (See *Bar Code Scanner User Guide*).

Entering patient information manually

To enter patient information manually

1 End the previous exam (see "Ending the exam" on page 85).

2 Tap **PATIENT**.

3 Tap a text box, and fill in the fields. See "Patient form fields" on page 77.

4 Tap **Done**.

Patient form fields

The patient form fields available depend on exam type. In some fields, you can enter symbols and special characters. See "To enter text using the onscreen keyboard" on page 10.

Patient

- **Last, First, Middle** Patient name
- **ID** Patient identification number
- **Date of Birth**
- **Gender**
- **Accession** Enter number, if applicable
- **Indications** Enter desired text

Exam

- **Exam** The exam types available depend on transducer. See "Selecting a transducer and exam type" on page 20. An asterisk next to an exam type indicates that it is a system-defined exam type (see "Customizing exam types" on page 176).
- **BP** (Cardiac or Arterial exam) Blood Pressure
- **HR** (Cardiac or Arterial exam) Heart Rate. Enter the beats per minute. Saving the heart rate using a measurement overwrites this entry.
- **Height** (Cardiac exam) The patient height in feet and inches or meters and centimeters. (To change the units, see "Presets settings" on page 60.)
- **Weight** (Cardiac exam). The patient weight in pounds or kilos. (To change the units, see "Presets settings" on page 60.)

- **BSA** (Cardiac exam) Body Surface Area. Automatically calculated after you enter height and weight.
- **Twins** (Obstetrical exam) Select the Twins check box to display Twin A and Twin B measurements on the calculations menu and for access to Twin A and Twin B screens for previous exam data.
- **LMP** or **EDD** (Obstetrical or Gynecology exam) In an Obstetrical exam, select LMP or EDD and then enter either the date of the last menstrual period or the established due date. In a Gynecology exam, enter the date of the last menstrual period. The LMP date must precede the current system date.
- **Previous Exams** (Obstetrical exam) Displays fields for five previous exams. The date for a previous exam must precede the current system date. For twins, select Twin A/B to toggle between Twin A and Twin B screens. (If the Twin A/B control does not appear, tap **Back**, and make sure that the Twins check box is selected.)
- **NT Credential** (Obstetrical exam) A combination of letters and numbers representing an Nuchal Translucency (NT) credential ID number. For example, P12345.

Facility

- **Institution**
- **Department ID**
- **User**
- **Reading Doctor**
- **Referring Doctor**

Acute Care Worksheets

If the Acute Care Worksheets licensed option is installed on your system, the patient form displays these fields, which also appear in the patient's Acute Care worksheet:

- **MR #** Medical record number.
- **Clinical Category** The exam's clinical category.

- **Exam Visit** Initial or Repeat.
- **Primary Obtaining/Interpreting** The primary person obtaining or interpreting the images.
- **Secondary Obtaining/Interpreting** The secondary person obtaining or interpreting the images.
- **Additional Obtaining/Interpreting** Any additional person obtaining or interpreting the images.

Routing Selection

When you associate one or more routing selections with an exam, the system reflects the routing selections in the patient report and in the Acute Care worksheet (if the Acute Care Worksheets licensed option is installed). See "Worksheets and reports" on page 286.

If you have specified a DICOM archiver as an Educational archiver, setting routing selections in the patient form affects how exams are archived. For more information, see "Routing selections" on page 106.

- **Procedural**
- **Diagnostics**
- **Educational/Accreditation**

Scheduled Procedure

Procedure fields are available only if the DICOM worklist feature is licensed and configured. See "DICOM" on page 87.

- **Scheduled Procedure: Name**
- **Scheduled Procedure: Protocol** Protocol for the selected procedure
- **Scheduled Procedure: Meaning** Definition of the selected procedure
- **Performed Procedure: Code** Desired procedure
- **Performed Procedure: Edit** Enables you to modify the Code list
- **Performed Procedure: Meaning** Definition of the performed procedure

- **Additional Worklist Query Parameters: Modality** Procedure types
- **Additional Worklist Query Parameters: Requested Procedure ID** The procedure ID

Entering patient information from the worklist

Using the worklist, you can import patient information from the Hospital Information System or Radiology Information System. (DICOM worklist is a licensed feature.)

The worklist is available after you do the following:

- Connect the system to the network
- Configure the system for DICOM transfer
- Select a worklist server for the active location

See "DICOM" on page 87.

To enter patient information from the worklist with a bar code scanner

You can specify that the system query the worklist for patient information when you scan a patient ID bar code.

1 On the User Profile setup page, select **Bar Code Auto Query** (see "User profile settings" on page 64).

2 Scan the patient's bar code.

The system queries the worklist and imports the information into the patient form.

To enter patient information from the worklist

1 Tap **PATIENT**.

2 Tap **Worklist**.

3 To sort the worklist, tap a column heading to sort by. By default, the worklist sorts in ascending order.

4 Do any of the following:

- To select one or more procedures for the patient, tap the procedure or procedures. You can select multiple procedures only for the same patient.
- To requery the server for an updated worklist, tap **Update**.

5 Tap **Select**.

The system populates the patient form. (Patient information from the worklist is uneditable.)

To return to the patient form without selecting a procedure, tap **Back**.

To view scheduled procedures

The patient information that you import from the worklist includes scheduled procedures.

♦ On the patient form, see the following lists under **Scheduled Procedures**:

- **Name** Scheduled procedures
- **Protocol** Protocol for the selected procedure
- **Meaning** Definition of the selected procedure

To change the procedure

You can select a procedure different from the scheduled procedure.

1 Under **Performed Procedure** on the patient form, select the desired procedure from the **Code** list.

The definition of the procedure appears in the **Meaning** field.

2 If you want to modify the **Code** list, tap **Edit**, and do one of the following:

Note: Required fields are marked with asterisks.

- Add an item: Tap **Add New**, and then fill in the **Code**, **Code Scheme Name**, and **Meaning** fields, and then tap **Save**.
- Delete an item: Select the item, and then tap .

Updating and querying the worklist

The worklist automatically updates if set up for an automatic worklist query (see "DICOM" on page 87). You can also manually update the worklist, and you can query the worklist server for a matching patient procedure.

The following table shows the parameters used for worklist queries. You set parameters on the worklist configuration page (see "DICOM" on page 87).

Query Parameters

	Manual Patient Query	Manual Update from Worklist	Automatic Query Update
Patient Data	√		
Date Range	√	√	√

	Manual Patient Query	Manual Update from Worklist	Automatic Query Update
This Device Only		√	√
Automatic Query On/Off			√
Occurs Every			√
Start Time			√

To manually update the worklist

1 On the patient form, tap **Worklist**.

2 Tap **Update**.

To perform a manual query

1 On a new patient form, do any of the following:

- Fill in any of the following fields for the query: **Last**, **First**, **Middle**, **Accession** , or **ID**.
  The query is on the characters you enter. For example, *Smith* returns *Smith*, *Smithson*, *Smithy*.
- Under **Additional Worklist Query Parameters**, specify any of the following:
  - **Modality** Select a procedure type from the list. US (Ultrasound) is the default.
  - **Requested Procedure ID** Type a procedure ID.

2 Tap **Query**.

The worklist appears with the query results. The number of results is in the lower right screen. The time of the last query appears below the worklist.

3 Highlight the patient procedure you want, and then tap **Select**.

The system imports the information into the patient form.

Editing patient information

You can edit patient information if the exam has not been archived or exported and if the information is not from a worklist.

To edit patient information

1 Tap **PATIENT**.

2 Make changes as desired.

3 Tap **Done**.

4 Do any of the following:

- Tap **Modify** to save the changes to the current patient.
- Tap **New** to start a new patient exam.
- Tap **Cancel** to discard your changes.

Ending the exam

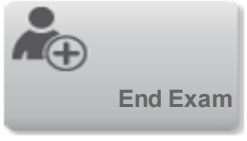
Note: Although you cannot add images and video clips to a patient exam that is ended, you can automatically start a new patient exam that has the same patient information. See "To append images and video clips to a patient exam" on page 297.

When you end an exam, the system resets imaging settings to the default settings for the selected exam type.

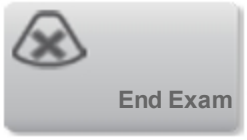
1 Make sure that you have saved images and other information that you want to keep. (See "Saving images and video clips" on page 178.)

2 Do either of the following:

- Tap **PATIENT**, and then tap **End Exam**.



- Tap **End Exam** in imaging, in review, or in worksheets. The system returns to the startup location as specified in User Profile settings (see "User profile settings" on page 64).



If **End Exam** isn't visible in imaging, specify that it appears as one of the four custom controls. See "User profile settings" on page 64.

Related topics

Connectivity settings 51
DICOM 87
Routing selections 106
Worksheets and reports 286

DICOM

Using data in the Digital Imaging and Communications in Medicine (DICOM) standard, the ultrasound system can do the following:

- Transfer patient exam data to an archiver, DICOM printer, or storage commitment server. See "Archiving and exporting" on page 303.
- Import patient data from a worklist. See "Entering patient information from the worklist" on page 80.
- Export exam data as DICOMDIR files to a USB storage device. See "USB settings" on page 70.

DICOM is a licensed feature. The system conforms to the DICOM standard as specified in the *X-Porte DICOM Conformance Statement*, available at www.sonosite.com.

The X-Porte *DICOM Conformance Statement* provides information about the purpose, characteristics, configuration, and specifications of the network connections supported by the system.

The system connects over a local area network (LAN) to the following:

- Picture Archive and Communication Systems (PACS) archivers
- Worklist servers
- Modality Performed Procedure Step (MPPS) servers
- DICOM printers
- Storage commitment servers

The system can transfer to one or more devices and connect to different networks, depending on how you configure it. The DICOM log collects network errors and events, typically to support diagnostics (see "Logs" on page 73).

Configuring the system for DICOM transfer

To configure the system for DICOM transfer, you do the following tasks (typically completed by a network administrator or PACS manager):

1 Back up default DICOM configuration settings to a USB memory stick kept in a secure location. You can revert to the default settings if necessary. See "Importing and exporting connectivity settings" on page 51.

2 Connect to the network. See "Connecting to the network " on page 88.

3 Complete the configuration pages for locations and devices. See "DICOM" on page 87.

4 Associate devices with locations. See "Associating devices with locations" on page 102.

Connecting to the network

Before configuring the system for DICOM transfer, you must connect to the network. You can connect by Ethernet or wirelessly.

If you connect by Ethernet, the X-Porte ultrasound system must be connected to a standard Ethernet 10/100/1000 network.

To connect to the network by Ethernet

Devices connected to the system's Ethernet port must comply with the IEC 60601-1 or IEC 60950 standards.

♦ Connect the Ethernet cable to the Ethernet port on the back of the dock (see "Ports " on page 12).

With the system on, the LAN link light (green LED) next to the Ethernet connector indicates physical connection to the network.

To connect to the network wirelessly

Wireless connectivity is a licensed feature.

1 Tap **MORE**, and then tap **System Settings**.

2 Tap **Connectivity** in the list on the left.

3 On the Connectivity setup page, tap **DICOM Setup**.

4 Tap **Config**.

5 Tap **Location**.

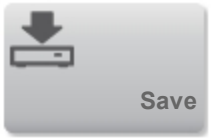
6 Tap **New** and complete the fields on the **DICOM Location** configuration page. Required fields are marked with asterisks. See "DICOM" on page 87.

7 Select **Wireless** on the **Location** configuration page.

8 Tap **Wireless Configuration**.

9 Complete the wireless connectivity fields. Required fields are marked with asterisks.See "DICOM" on page 87.

10 Tap **Save**.



The wireless icon indicates the status of the wireless connection (the number of white bars indicates the strength of the connection).

(Optional) To import or delete wireless certificates

If your security scheme requires it, you can import wireless certificates. The system supports the following file types: CER, PFX, and PVK.

Caution: To avoid losing data from or damaging the USB memory stick, do not remove the USB memory stick or turn off the ultrasound system while exporting. In addition, do not bump or apply pressure to the USB memory stick while it is connected to the system. The connector could break.

1 Tap **MORE**, and then tap **System Settings**.

2 Tap **Connectivity** in the list on the left.

3 On the Connectivity setup page, tap **Wireless Certificates**.

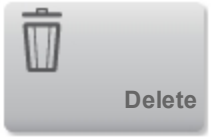
A list of certificates on the system appears.

4 Do one of the following:

- Import certificates: Connect the USB memory stick that contains the certificates (see "USB devices" on page 23). Verify that the certificates on the system, plus those on the USB memory stick, do not exceed 20 certificates or 200K of memory. Delete certificates if necessary. Then tap **Import**.

  Note: Certificates on the USB memory stick replace certificates on the system.

- Delete certificates: Select the certificates to delete, and then tap **Delete**.

5 Tap **Done**.

6 Restart the system.

DICOM configuration pages

The DICOM configuration pages are as follows:

Location Configuration for network settings, including settings for a wireless network connection. Also specifies which devices you want to associate with that network. For example, configure a location called “Office,” and then associate a printer and archiver with it. You can configure up to eight locations. (See "Associating devices with locations" on page 102.)

Archive Configuration for PACS archivers, devices for storing patient exams (images and clips). Only one archiver per location can receive in-progress image transfers. You can associate up to four archivers per location.

Printer Configuration for DICOM printers for printing images. You can associate up to two printers per location.

Storage Commit Configuration for storage commitment servers, devices that take responsibility for and provide receipt of content sent by the ultrasound system.

Worklist Configuration for worklist servers, devices that contain scheduled patient procedure data. You can import the data into the patient form (see "Entering patient information" on page 76).

MPPS Configuration for MPPS servers, devices that coordinate detailed information about the exam performed. You can associate one MPPS server per location.

To configure a new location or device

Note: Changing the configuration can require a system restart.

1 Tap **MORE**, and then tap **System Settings**.

2 Tap **Connectivity** in the list on the left.

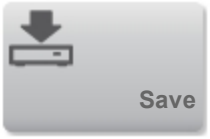
3 On the Connectivity setup page, tap **DICOM Setup**.

4 Tap **Config**.

5 From the **DICOM** list, select a configuration page.

6 Tap **New**.

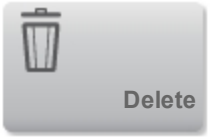
7 Complete the configuration setup fields, and tap **Save**.



To delete a location or device

1 On the proper configuration page, select the name from the list of locations or devices.

2 Tap **Delete**.



3 Tap **Yes** to confirm the deletion.

4 Tap **Done**.

Configuration setup fields

Location

Required fields are marked with asterisks.

Name

Unique network name for the ultrasound system. The default is SonoSite.

Alias
Name that identifies the network location of the ultrasound system.

AE Title
DICOM Application Entity Title.

Port
Device port number. IP port 104 is typically assigned for DICOM.

DHCP
If desired, select to enable Dynamic Host Configuration Protocol. The IP Address, Subnet Mask, and Default Gateway fields become unavailable.

IP Address
Unique identifier of the ultrasound system location. Cannot be between 127.0.0.0 and 127.0.0.8.

Subnet Mask
Identifies a network subdivision. The default value is 255.255.0.0.

Default Gateway
IP address where network connects to another network. Cannot be between 127.0.0.0 and 127.0.0.8.

Transfer Images
Specify when to transfer images: during or at end of exam.

JPEG Compression
Select High, Medium, or Low. A high compression has a smaller file size but less detail. For best image quality, select Low. See "Limitations of JPEG format" on page 71.

Wireless
Select if configuring a wireless location.

The following fields are available for wireless network connections:

Profile Name
Name of the profile set for this location. For each wireless location, you can have up to 10 profiles.

Network Name (SSID)
Network Name Service Set Identifier for the router.

Security Policy
Security type that authenticates the network:

- **Open** No security.
- **WEP** or **Shared WEP** The following fields appear:
  - **Encryption** Encryption key type (64 bit or 128 bit)
  - **Key index** WEP key index 1-4. Network location where a specific key is stored.
  - **Key** WEP key value used to encrypt data.
- **RADIUS** Remote Access Dial-Up User Service -802.1x Key Exchange. The following fields appear:
  - **Authentication Type** Select one of the following:
    - **EAP-TLS** Extensible Authentication Protocol-Transport Layer Security. The following fields appear:
      - **User Name** Name of designated user.
      - **Client Certificate** Select from the list of client certificates installed on the system.
      - **Private Key** One of a pair of keys (public and private) that is provided only to the requestor and never shared.
      - **Private Key Password** A unique combination of letters and symbols that allows user access.
      - **Certification Authority** Validates the authentication server or certificate authority. The list is populated by wireless certificates that you have imported. (See "(Optional) To import or delete wireless certificates" on page 90.) Select the desired certificate from the list.
    - **EAP-PEAPV0**
      - **User Name** Name of designated user.
      - **Password** A unique combination of letters and symbols that allows user access.

        - **Certification Authority** Validates the authentication server or certificate authority. The list is populated by wireless certificates that you have imported. (See "(Optional) To import or delete wireless certificates" on page 90.) Select the desired certificate from the list.

- **WPA or WPA2** Wi-Fi Protected Access. The following fields appear:
    - **Authentication** If you select **PERSONAL**, the **Passphrase** field appears; enter the WPA Shared Key entry used in configuring the router.
    - **Encryption** Encryption protocol for the router.
    - **Authentication Type** Select one of the following:
    - **EAP-TLS** Extensible Authentication Protocol-Transport Layer Security. The following fields appear:
        - **User Name** Name of designated user.
        - **Client Certificate** Select from the list of client certificates installed on the system.
        - **Private Key** One of a pair of keys (public and private) that is provided only to the requestor and never shared.
        - **Private Key Password** A unique combination of letters and symbols that allows user access.
        - **Certification Authority** Validates the authentication server or certificate authority. The list is populated by wireless certificates that you have imported. (See "(Optional) To import or delete wireless certificates" on page 90.) Select the desired certificate from the list.
    - **EAP-PEAPv0** Extensible Authentication Protocol-Protected Extensible Authentication Protocol. The following fields appear:
        - **User Name** Name of designated user
        - **Password** A unique combination of letters and symbols that allows user access.
        - **Certification Authority** Validates the authentication server or certificate authority. The list is populated by wireless certificates that you have imported. (See "

(Optional) To import or delete wireless certificates" on page 90.) Select the desired certificate from the list.

Archiver

Required fields are marked with asterisks.

Name
Network host name for an archiver.

Alias
Personalized name for an archiver.

AE Title
Archiver DICOM Application Entity Title.

Images
Defines how images are sent to the archiver: RGB (uncompressed), Mono (uncompressed), or JPEG.

Image Type
List of archiver image types, based on capture mode.

IP Address
Unique identifier for the archiver.

Port
Device port number. IP port 104 is typically assigned for DICOM.

Ping
Tap to determine whether the IP address is accessible. The system displays OK or Failed.

Exclude Video Clips
If the check box is selected, only images (no video clips) are transferred. Available only if Image Type is set to Ultrasound.

Include CDA
Select this check box to send the CDA report to the archiver.

Include SR
Select this check box to send the Structured Report to the archiver.

Educational
Select this check box to associate the archiver with the **Educational** routing select. See "Routing selections" on page 106.

Printer

Required fields are marked with asterisks.

Name
Network host name for a printer.

Alias
Personalized name for a printer.

IP Address
Unique identifier for the printer.

Port
Device port number. IP port 104 is typically assigned for DICOM.

AE Title
Printer DICOM Application Entity Title.

Ping
Select to determine whether the IP address is accessible. The system displays OK or Failed.

Model
List of Agfa, Codonics, and Kodak printer models. If your model is not listed, choose a generic model at the end of the list.

Film Size
Film sizes supported by the printer.

Film Type
Film medium supported by the printer.

Destination
Location film is placed after it is printed.

Format
Number of columns and rows in the image printout.

Orientation
Film layout.

Settings
Defines how images are sent to the printer, either as Color (RGB) or Monochrome images.

Copies
Number of copies to print for each image.

Priority
Importance of the print job.

Max
Maximum density of the black value (in hundredths of optical density (OD)).

Min
Minimum density of the white value (in hundredths of optical density (OD)).

Border
Density of the areas surrounding and between film images (in hundredths of optical density (OD)) .

Empty
Empty image density (in hundredths of optical density (OD)).

Magnification
Type of interpolation used during printing.

Configure
Printer-specific configuration value. If using generic printer settings, no configuration strings are available.

Storage Commit

Required fields are marked with asterisks.

Name
Unique network name for the ultrasound system. Default is SonoSite.

Alias
Name that identifies the network location of the ultrasound system.

AE Title
DICOM Application Entity Title.

IP Address
Unique identifier of the storage commitment server.

Port
Device port number. IP port 104 is typically assigned for DICOM.

Ping
Tap to determine whether the IP address is accessible. The system displays OK or Failed.

Worklist

Required fields are marked with asterisks.

Name
Network host name for a worklist server.

Alias
Personalized name for a worklist server.

AE Title
Application Entity Title.

Worklist
Today; Yesterday, today, tomorrow; All.

This Device Only
Restricts the query to patient procedures that are scheduled for the system based on its AE Title.

Modality
US (Ultrasound) is the default procedure type.

IP Address
Unique identifier for the worklist server.

Port
Device port number. IP port 104 is typically assigned for DICOM.

Automatic Query
Turns automatic query on/off.

Occurs Every
In an automatic query, length of time between automatic updates.

Start Time
In an automatic query, start time for the automatic update (displayed in 24 hour time).

Ping
Tap to determine whether the IP address is accessible. The system displays OK or Failed.

MPPS

Required fields are marked with asterisks.

Name
Network host name for the MPPS server.

Alias
Name that identifies the network location of the ultrasound system.

AE Title
DICOM Application Entity Title.

IP Address
Unique identifier of the MPPS server.

Port
Device port number. IP port 104 is typically assigned for DICOM.

Ping
Tap to determine whether the IP address is accessible. The system displays OK or Failed.

Associating devices with locations

For each location, select which devices (archivers and printers) you want to receive the data that you transfer, which archivers you want to designate as an MPPS or storage commitment server, and which worklist server you want to receive data from. Once these selections are complete, select the location you want to use.

Note: Changing the configuration requires a system restart.

To associate devices with a location

The devices must be configured before you can associate them. See "To configure a new location or device" on page 92.

1 Tap **MORE**, and then tap **System Settings**.

2 Tap **Connectivity** in the list on the left.

3 On the Connectivity setup page, tap **DICOM Setup**.

4 In the **Location** list, select the location of the system.

5 In the list of devices, select the check box next to one or more archivers, printers, or worklist servers.

You can select a maximum of two printers, four archivers, and one worklist server for each location. Only one archiver can be selected to receive in-progress transfers. Selected devices have a check mark in the left-hand column.

6 If you want to use the MPPS service, associate the MPPS server with the archiver:

a Select the check box of the MPPS server that you want. (MPPS servers appear near the end of the list.)

b Select the check box of the archiver.

c Select the check box in the archiver's MPPS column.

7 If you want to use the storage commitment service, associate the storage commitment server with the archiver:

a Select the check box for the storage commitment server that you want. (Storage commitment servers appear at the end of the list.)

b Select the check box for the archiver.

c Select the check box in the archiver's SC column.

8 Complete any additional configuration tasks, and then tap **Done**.

To disassociate devices with a location

1 Tap **MORE**, and then tap **System Settings**.

2 Tap **Connectivity** in the list on the left.

3 On the Connectivity setup page, tap **DICOM Setup**.

4 In the **Location** list, select the location.

5 Do any of the following:

- To disassociate a printer, archiver, or worklist server, select its check box.
- To disassociate an MPPS server from an archiver, select the check box for the MPPS server.
- To disassociate a storage commitment server from an archiver, select the check box for the storage commitment server.
- To disassociate an archiver from all servers, deselect and then reselect its check box.

6 Tap **Done**.

To verify the connection status of devices

1 On the Connectivity setup page, tap **DICOM Setup**.

2 Select the device you want to verify, and tap **Verify** to confirm that the associated devices are connected. (If **Verify** is unavailable, check cable and wireless connections. Restart the system if you changed configuration. If the problem continues, see your system administrator.)

The connection status of the devices appears in the **Status** column:

- **Failed** DICOM cannot communicate with the device.
- **Success** DICOM can communicate with the device.
- **Unknown** The device does not support the C-ECHO (for example, Verify query command).

Related topics

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Entering patient information 76
Worksheets and reports 286
CDA Report settings 48
Archiving and exporting 303
Network Status settings 58
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Routing selections 106

Routing selections

Routing selections let you control where patient exams are archived. You can associate one or more routing selection with an exam.

The system supports three routing selections:

- Diagnostics
- Educational/Accreditation
- Procedural

You can associate the Educational/Accreditation routing selection with a DICOM archive device (see "Specifying educational DICOM archivers" on page 107).

Associating routing selections with exams

When you associate one or more routing selections with an exam, the system reflects the routing selections in the patient report and in the Acute Care worksheet (if the Acute Care Worksheets licensed option is installed). See "Worksheets and reports" on page 286.

You can associate an exam with a routing selection during an exam or after ending an exam.

To associate a routing selection during an exam

1 Tap **PATIENT**.

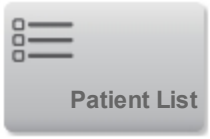
2 Select one or more routing selections in the **Routing Selection** section of the patient form.

To associate a routing selection after an exam

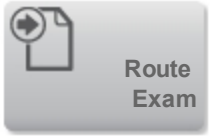
When you change the routing selection after an exam has ended, the system updates the patient report.

1 Tap **REVIEW**.

2 Tap **Patient List**.



3 Select the check box next to the exam, and then tap **Route Exam**.



4 Select one or more options in the **Routing Selection** section.

Specifying educational DICOM archivers

When you associate the Educational/Accreditation routing selection with a DICOM archiver, the system archives exams associated with the Educational/Accreditation routing selection to that archiver.

Archivers that are not specified as educational are *procedural* (billing) archivers. The system archives exams associated with the Diagnostic and Procedural routing selections to these archivers.

If you do not specify an archiver as an educational archiver, exams associated with the Educational/Accreditation routing selection are also sent to the procedural (billing) archiver.

If an exam is associated with more than one routing selection, the system archives it to both the procedural (billing) archiver and to the educational archiver.

To specify an educational archiver

Note: If you specify an archiver as an educational archiver, exams that aren't associated with a routing selection will not transfer to any archiver. (You can associate an exam with a routing selection once the

exam has ended. See "To associate a routing selection after an exam " on page 106.)

1 Make sure that the system is configured for DICOM transfer. See "DICOM" on page 87.

2 Tap **MORE**, and then tap **System Settings**.

3 Tap **Connectivity**.

4 On the Connectivity system setup page, tap **DICOM Setup**.

5 Tap **Config**.

6 From the **DICOM** list, select the **Archive** configuration page for the archiver.

7 Select **Educational**.

8 Tap **Done**.

Related topics

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Scanning

X-Porte offers four different imaging modes: **2D** (see "2D" on page 110), **Color**, (see "Color" on page 110), **Doppler** (see "Doppler" on page 114), and **M Mode** (see "M Mode" on page 116). You can also view 2D or color images in Dual (see "Dual" on page 112).

For information about working with controls, see "Imaging controls" on page 129.

2D

1 Do one of the following:

- Tap **2D**.

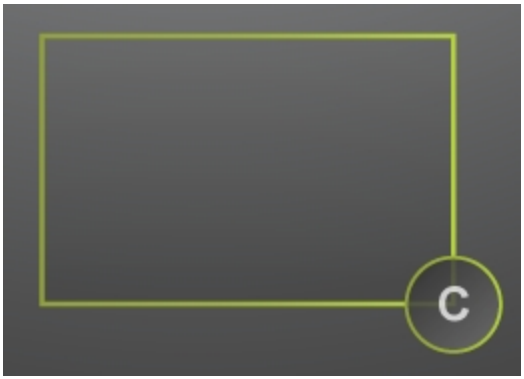
- In Transducers & Exams, tap **SCAN**.

2 Adjust controls as needed. See "Controls in 2D" on page 131.

Color

1 Tap **Color**.

The color box appears.



2 Position and resize the color box as needed:

- To position, do either of the following:
  - Drag the box.
  - With two or more fingers, drag anywhere on the touch panel.
- To resize, do either of the following:
  - Pinch or spread the box.
  - Drag its handle

.

    A green outline shows that the status of the change is active. On the clinical monitor, the current outline remains in gray until you stop moving or release your finger.

- To steer (linear transducers only), do either of the following:
  - Swipe left or right.
  - Tap **Steering** and select an angle.

3 Adjust controls as needed. See "Controls in Color" on page 142.

Dual

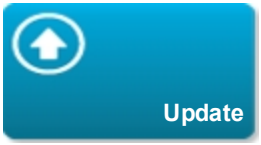
Dual is available in 2D and in Color.

1 Tap **Dual**. When **Dual** is on, the control is highlighted.

If this control is hidden, tapping **More Controls** displays it.

2 Do either of the following to make an image active:

- Tap the right-hand or left-hand image.
- Tap **Update** to switch between the right-hand and left-hand images.



If this control is hidden, tapping **More Controls** displays it.

When you switch between images in live imaging, the selected image inherits the settings of the previously selected image.

3 Adjust controls as needed. See "Controls in 2D" on page 131 and "Controls in Color" on page 142.

Tap **Dual** again to turn it off.

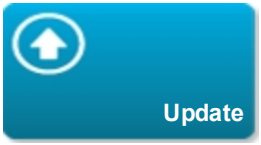
To view frames in the cine buffer in Dual

You can view independent cine buffers for side-by-side images in Dual.

1 Tap **Dual**. When **Dual** is on, the control is highlighted.

2 Do either of the following to make an image active:

- Tap the right-hand or left-hand image.
- Tap **Update** to switch between the right-hand and left-hand images.



If this control is hidden, tapping **More Controls** displays it.

3 Tap **FREEZE**.

4 Do any of the following:

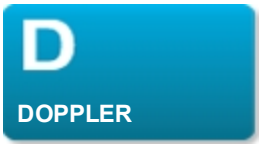
- Drag the slider. Right moves forward, and left moves backward.
- Tap or to move forward or backward through frames one at a time.

  The current frame number appears on the touch panel. The frame number changes as you move forward or backward.

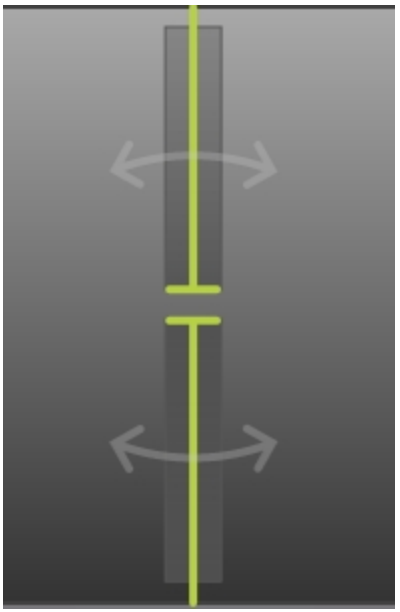
- Tap the right-hand or left-hand image, or tap **Update** to switch between the right-hand and left-hand images.

Doppler

1 Tap **Doppler**.



The D-line appears.

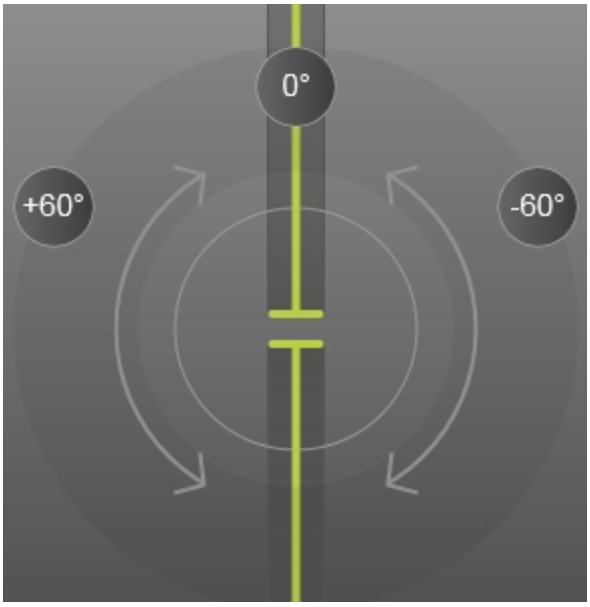


2 Do any of the following as needed:

- Adjust controls as needed. See "Controls in Doppler" on page 157.
- Position the D-line by dragging.

- Adjust the gate size by pinching or spreading.
- Correct the angle: Tap the double-headed arrows on the D-line, and then do either of the following:
  - Tap **+60°**, **0°**, or **-60°**.
  - Drag the round handle circularly.

    Note: You can also correct the angle by using the Angle Correct control. See "Controls in Doppler" on page 157.

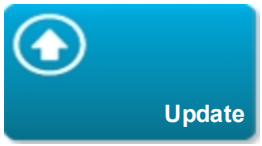


Correcting the D-line angle

- To steer the D-line, do one of the following:
  - Swipe left or right.
  - Tap **Steering**.

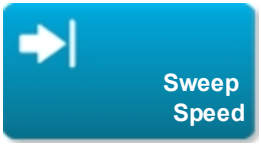
3 To display the spectral trace, do the following:

a Tap **Start** or **Update**.



b Do any of the following:

- Tap **Stop** and **Start** to stop and start the spectral trace.
- Tap **Sweep Speed** and then tap a sweep speed: **Fast**, **Medium**, or **Slow**.



If this control is hidden, tapping **More Controls** displays it.

- Activate the trace or the 2D image by tapping them, or tap **Update** to toggle between the trace and the 2D pane.

  If this control is hidden, tapping **More Controls** displays it.

- Adjust controls as needed. See "Controls in Doppler" on page 157.

M Mode

1 Tap **M Mode**.

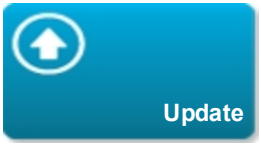
The M-line appears.

2 Drag the M-line to the desired position.

3 To display the M Mode trace, do the following:

a Adjust the depth as needed. See "Adjusting depth and gain" on page 188.

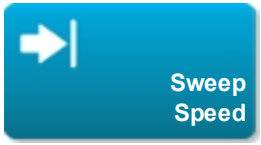
b Tap **Start** or **Update**.



If this control is hidden, tapping **More Controls** displays it.

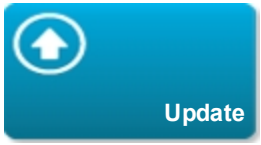
c Do any of the following:

- Tap **Stop** and **Start** to stop and start the M Mode trace.
- Tap **Sweep Speed** and then tap a sweep speed: **Fast**, **Medium**, or **Slow**.



If this control is hidden, tapping **More Controls** displays it.

- Activate the trace or the 2D image by tapping them, or tap **Update** to toggle between the trace and the 2D pane.



If this control is hidden, tapping **More Controls** displays it.

4 Adjust controls as needed. See "Controls in M Mode" on page 151.

Related topics

Doppler imaging 126
Color imaging 123
M Mode imaging 121
2D imaging 119
Dual 128
Controls in 2D 131
Controls in Color 142
Controls in Doppler 157
Controls in M Mode 151
M-line 120
D-line 125

2D imaging

2D is the system's default imaging mode. The system displays echoes in two-dimensional view by assigning a brightness level based on the echo signal amplitude. See "Scanning" on page 110.

Related topics

Controls in 2D 131
Scanning 110
Doppler imaging 126
Color imaging 123
M Mode imaging 121
Dual 128

M-line

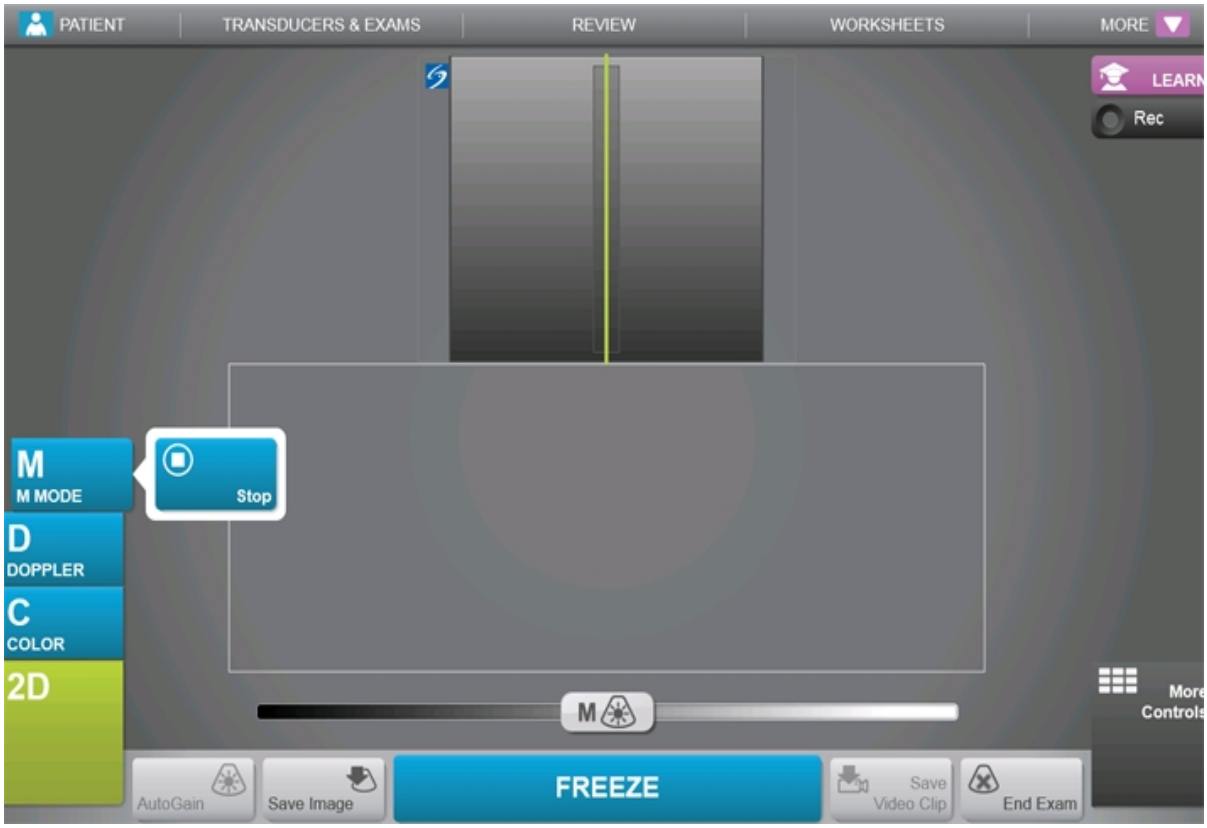
When you tap **M Mode**, the M-line appears. You can drag the M-line to the area of interest before you display the M Mode trace. See "Scanning" on page 110.

Related topics

M Mode imaging 121
Scanning 110
Controls in M Mode 151

M Mode imaging

Motion mode (M Mode) is an extension of 2D. It provides a trace of the 2D image displayed over time. A single beam of ultrasound is transmitted, and reflected signals are displayed as dots of varying intensities, creating lines across the screen. See "Scanning" on page 110.



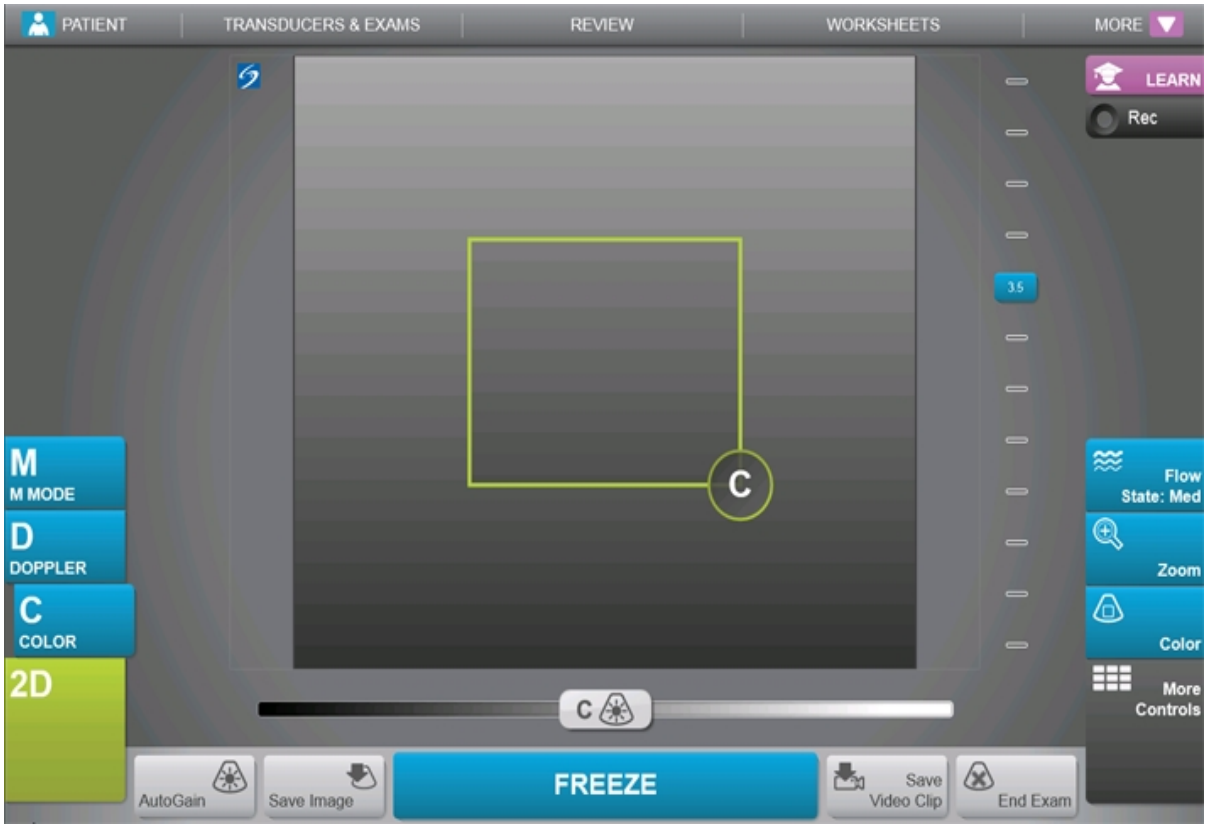
Related topics

Controls in M Mode 151
Scanning 110
Doppler imaging 126
Color imaging 123
2D imaging 119

Dual 128
M-line 120

Color imaging

Color imaging shows the presence, velocity, and direction of blood flow toward and away from the transducer. In Color mode, the area within the highlighted box displays blood flow in color. See "Scanning" on page 110.



Related topics

Scanning 110
Doppler imaging 126
M Mode imaging 121
2D imaging 119
Dual 128

Controls in Color 142

D-line

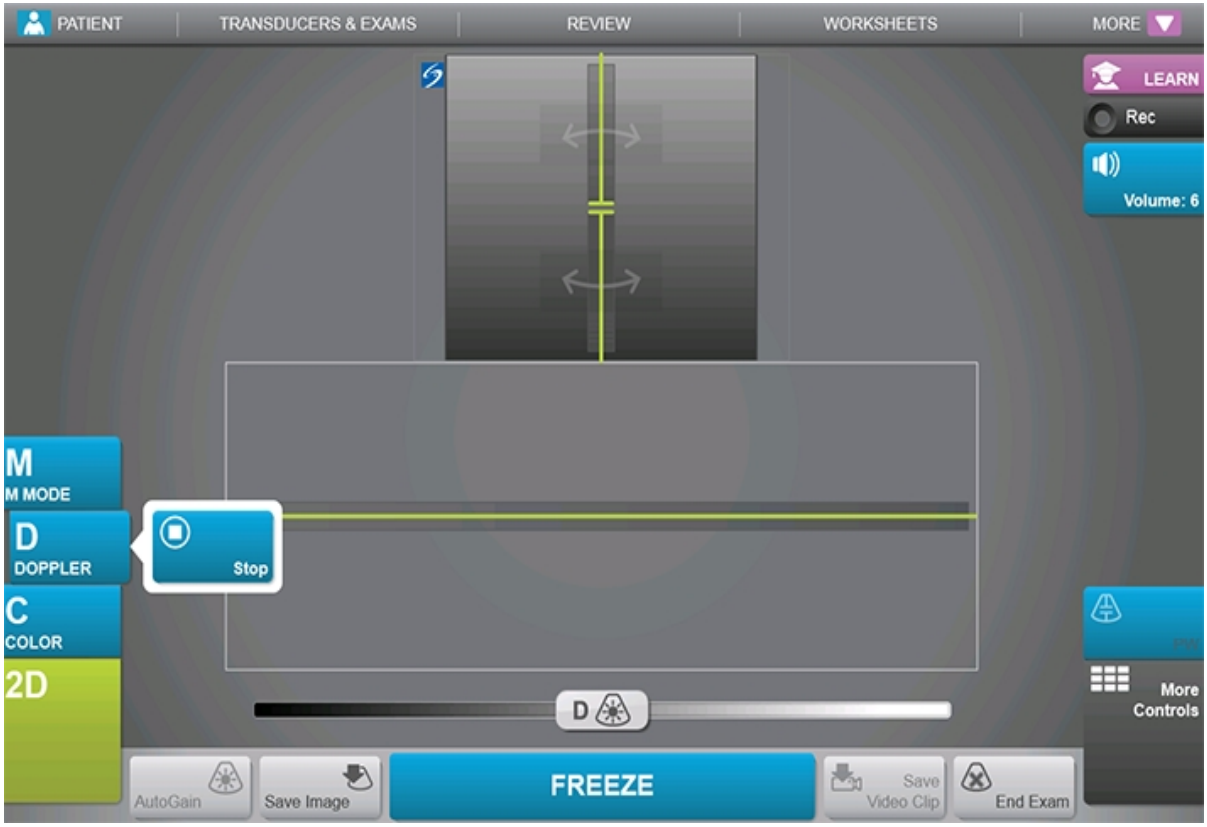
When you tap **Doppler**, the D-line appears. You can position the D-line, adjust the gate size, or correct the angle of the D-line before you display the Doppler trace. See "Scanning" on page 110.

Related topics

Doppler imaging 126
Controls in Doppler 157
Scanning 110

Doppler imaging

Doppler imaging is a display of a spectrum of flow velocities over time. The amplitude of the signal is indicated as a shade of gray. Doppler imaging can be used to display any type of movement, including blood flow and tissue movement. Pulsed wave (PW), pulsed wave Tissue Doppler Imaging (PW TDI), and continuous wave (CW) Doppler are available. CW Doppler is not range specific. See "Scanning" on page 110.



Related topics

Scanning 110
Color imaging 123
M Mode imaging 121

2D imaging 119
Dual 128
Controls in Doppler 157
D-line 125

Dual

Dual displays side-by-side 2D images. The system displays independent image information for each image, for example, Depth, color maps, and orientation markers. You can switch between the two images and adjust some controls (for example, Depth and Gain) independently. You can view frames in the cine buffer for both images independently.

Dual is available in 2D and in Color. See "Dual" on page 112.

Related topics

Scanning 110
Doppler imaging 126
Color imaging 123
M Mode imaging 121
2D imaging 119

Imaging controls

The imaging controls let you adjust the image and related parameters, label, zoom, and more.

For each imaging mode, you can place your favorite and most-used controls in the Controls bar, located on the right side of the touch panel. You can place controls for the frozen image as well as for the live image. The remaining controls are still accessible in the More Controls window.

Available controls depend on the imaging mode, system configuration, and whether the image is live or frozen.

To access a control in the More Controls window

1 Tap **More Controls**.

2 If necessary, tap the imaging mode (for example, **2D**) at the top of the **More Controls** window. (The control for the active imaging mode is blue.)

Multiple imaging modes are available if one of them includes another. For example, because 2D is a subset of M Mode, you can choose from both 2D and M Mode controls when scanning in M Mode.

3 Tap the control.

4 If necessary, close the control: tap the X in the upper left corner of the control, or tap anywhere in the More Controls window.

To close the More Controls window, tap **More Controls**, or tap anywhere outside the More Controls window.

To place controls in the Controls bar

1 Start the imaging mode whose controls you want to place (see "Scanning" on page 110).

2 If placing controls for frozen imaging, freeze the image (see "To freeze the image" on page 186).

3 Tap **More Controls**.

The More Controls window appears.

4 Do the following for each imaging mode available:

- At the top of the window, tap the imaging mode (for example, **2D**).

Note: Multiple imaging modes are available if one of them includes another. For example, because 2D is a subset of M Mode, you can choose from both 2D and M Mode controls when scanning in M Mode.

- Drag each control to the Controls bar, into the desired position.

  You can drag the control up or down to another position, or you can drag it back into the More Controls window.

  You can place up to seven controls in the Controls bar.

To close the More Controls window, tap **More Controls**, or tap anywhere outside the More Controls window.

Related topics

Controls in Color 142
Controls in Doppler 157
Controls in M Mode 151
Controls in 2D 131
Presets settings 60

Controls in 2D

To specify which controls appear in the Controls bar, see "Imaging controls" on page 129. Some controls appear only when the image is frozen. See "Controls in frozen 2D" on page 139.

Turns Tissue Harmonic Imaging (THI) on and off.

Tap this control to turn it on (highlighted icon) or off (dimmed icon).

Available in only certain exam types.

Available in	
Live	**Frozen**
√	

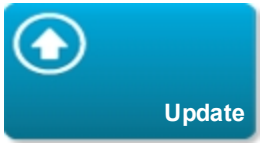
Turns SonoMB multi-beam imaging technology on and off.

SonoMB technology enhances the 2D image by viewing a target from multiple angles and then merging or averaging the data to improve overall image quality and to reduce noise and artifacts.

Available only in certain exam types.

Tap this control to turn it on (highlighted icon) or off (dimmed icon).

Available in	
Live	**Frozen**
√	



Updates the image. In Dual, tapping the control switches the active side from left to right or right to left. In Doppler or M Mode, tapping the control toggles between the trace and the 2D pane.

Available in	
Live	**Frozen**
√	√

Enhances linear structures within a selected angle range and can facilitate needle guidance. See "Visualizing needles" on page 190.

Available in	
Live	**Frozen**
√	

Sets the image orientation, allowing you to align the image with the transducer.

Tap to select the orientation: **Upper Right**, **Upper Left**, **Lower Left, Lower Right**.

Available in	
Live	**Frozen**
√	

Optimizes the image by adjusting a collection of settings such as focal zones, aperture size, frequency (center and bandwidth), and waveform.

In general, use the left-hand (Average) optimization. Use the right-hand (Difficult) optimization if the exam requires additional penetration. Tap to switch between the two optimization settings.

Available in	
Live	**Frozen**
√	

Displays side-by-side 2D images, for which you can adjust some controls (for example, Depth and Gain) independently.

Tap this control to turn it on (highlighted icon) or off (dimmed icon).

With Dual on, tapping the right-hand or left-hand image (or tapping **Update**) makes the image active.

See "Dual" on page 128.

Available in	
Live	**Frozen**
√	√

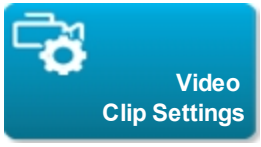
Sets levels for the **AutoGain** control: adjusting to the positive side brightens images when you tap **AutoGain**, adjusting to the negative side makes images darker when you tap **AutoGain**. See "Gain" on page 188. The control is only available if **AutoGain** is on (see "Gain" on page 188). Tap this control and then drag the slider (the range is **-6** to **+6**) or tap **+3**, **0**, or **-3**.

The **AutoGain Adjust** control is disabled when you perform any action that turns off **AutoGain**, such as changing depth.

Available in	
Live	**Frozen**
√	

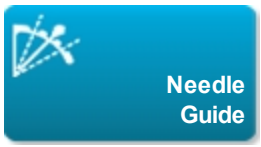
Available only in the Cardiac exam type. Specifies the sector width. Tap this control and then tap **Narrow**, **Medium**, or **Full**.

Available in	
Live	**Frozen**
√	



See "Saving video clips" on page 179.

Available in	
Live	**Frozen**
√	√



Turns needle guidelines on and off. For more information, including a list of transducers that are needle-guide capable and important safety information, see the transducer's user guide and the *SonoSite Bracket and Needle Guide User Guide*.

Available in	
Live	**Frozen**
√	

Displays ECG trace options. ECG is available only on the cardiac exam type on the P21xp transducer. See "ECG" on page 311.

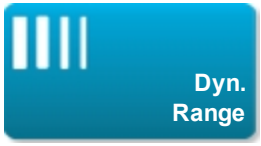
Available in	
Live	**Frozen**
√	

Allows you to view the image uninterrupted; for example, during a needle insertion procedure. When this control is enabled, the following are disabled:

- Dialog boxes or other system elements that block the image
- Sleep mode and automatic power-off

Tap this control to turn it on (highlighted icon) or off (dimmed icon).

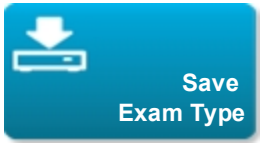
Available in	
Live	**Frozen**
√	



Adjusts the grayscale range. Tap the control and then tap **Up** or **Down** to select a setting: -3,-2,-1, 0, +1,+2,or +3.

The positive range increases the number of grays displayed, and the negative range decreases the number of grays displayed.

Available in	
Live	**Frozen**
√	√



See "Customizing exam types" on page 176.

Available in	
Live	**Frozen**
√	√

Measures the distance from the skin line to a specified point on the image. For instructions, see "Measuring" on page 202.

Available in	
Live	**Frozen**
√	√

Provides tools that let you place text, pictographs, and arrows onto an image. See "Labeling images" on page 194.

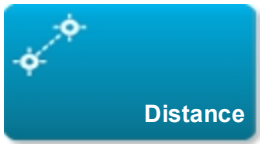
Available in	
Live	**Frozen**
√	√

Magnifies the image. See "Zooming" on page 183.

Available in	
Live	**Frozen**
√	√

Controls in frozen 2D

The following controls are available only in frozen 2D.



Measures the distance between two points.

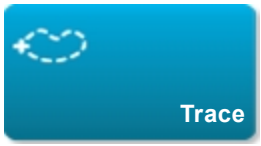
See "Measuring" on page 202.

Available in	
Live	**Frozen**
	√

Uses an ellipse to measure a region's circumference or area.

See "Measuring" on page 202.

Available in	
Live	**Frozen**
	√



Lets you trace manually to measure an irregular shape.

See "Measuring" on page 202.

Available in	
Live	**Frozen**
	√

See "About calculations " on page 211.

Available in	
Live	**Frozen**
	√

The Acute Care calculations are part of the licensed Acute Care feature. See "Acute Care calculations" on page 259.

Available in	
Live	**Frozen**
	√

Related topics

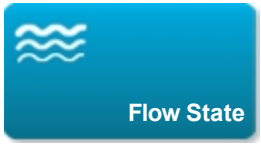
2D imaging 119
Imaging controls 129
Controls in Color 142
Controls in Doppler 157
Controls in M Mode 151
Scanning 110

Controls in Color

To specify which controls appear in the Controls bar, see "Imaging controls" on page 129. Some controls appear only when the image is frozen. See "Controls in frozen Color" on page 148.

Allows you to select **Color**, Color Power Doppler (**CPD**), or **Variance**. On the P21xp transducer in the Cardiac exam type, **Variance** is available instead of **CPD**. **CPD** shows amplitude and is useful for very low flow states. **Variance** displays a color map that shows regurgitant jet turbulence. The highest velocities appear as green.

Available in	
Live	**Frozen**
√	



Lets you adjust the sensitivity of color parameters or settings to enhance the flow state. The system initially selects a setting based on the exam type.

- **High** optimizes for high flow states such as cardiac. The High setting minimizes flash artifacts.
- **Medium** optimizes for medium flow states such as abdominal or arterial flow.
- **Low** optimizes for low flow states such as breast or musculoskeletal.

For a more precise setting, adjust the Scale control.

Available in	
Live	**Frozen**
√	

Sets the pulse repetition frequency (PRF). Tap this control, and then tap **Up** or **Down**.

Available in	
Live	**Frozen**
√	

Helps to filter out echoes from low frequency signals.

Tap to select the strength of the filter: **Low**, **Med**, or **High**.

Available in	
Live	**Frozen**
√	

(Linear transducers only)

Determines the angle of the color box (see "Color imaging " on page 123), saving work in repositioning the transducer.

If adding Doppler, see "Controls in Doppler" on page 157.

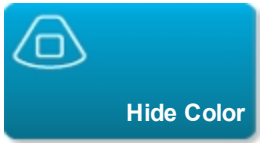
Available in	
Live	**Frozen**
√	

Switches the displayed direction of the flow, helping reduce the need of repositioning the transducer.

Tap this control to turn it on (highlighted icon) or off (dimmed icon).

Invert is unavailable when **Color** is set to **CPD**.

Available in	
Live	**Frozen**
√	√

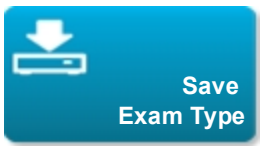


Shows and hides color. For example, you may want to hide color temporarily to view vascular plaque.

Available in	
Live	**Frozen**
√	√

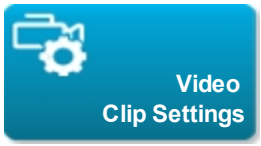
Magnifies the image. See "Zooming" on page 183.

Available in	
Live	**Frozen**
√	√



See "Customizing exam types" on page 176.

Available in	
Live	**Frozen**
√	√



See "To set video clips controls" on page 179.

Available in	
Live	**Frozen**
√	

Measures the distance from the skin line to a specified point on the image. For instructions, see "Measuring" on page 202.

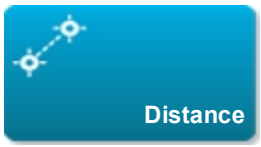
Available in	
Live	**Frozen**
√	√

Provides tools that let you place text, pictographs, and arrows onto an image. See "Labeling images" on page 194.

Available in	
Live	**Frozen**
√	√

Controls in frozen Color

The following controls are available only in frozen Color.



Measures the distance between two points.

See "Measuring" on page 202.

Available in	
Live	**Frozen**
	√

Uses an ellipse to measure a region's circumference or area.

See "Measuring" on page 202.

Available in	
Live	**Frozen**
	√

Lets you trace manually to measure an irregular shape.

See "Measuring" on page 202.

Available in	
Live	**Frozen**
	√

See "About calculations " on page 211.

Available in	
Live	**Frozen**
	√

The Acute Care calculations are part of the licensed Acute Care feature. See "Acute Care calculations" on page 259.

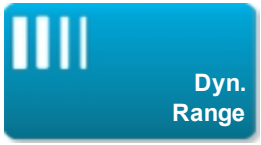
Available in	
Live	**Frozen**
	√

Related topics

Imaging controls 129
Controls in Doppler 157
Controls in M Mode 151
Controls in 2D 131
Color imaging 123
Scanning 110

Controls in M Mode

In M Mode imaging, you can adjust the following controls in addition to most of the 2D controls (the 2D controls are available in M-line--see "M-line" on page 120 and "Controls in 2D" on page 131). To specify which controls appear in the Controls bar, see "Imaging controls" on page 129. Some controls appear only when the image is frozen. See "Controls in frozen M Mode" on page 155.



Adjusts the grayscale range. Tap the control and then tap **Up** or **Down** to select a setting: -3,-2,-1, 0, +1,+2, or +3.

The positive range increases the number of grays displayed, and the negative range decreases the number of grays displayed.

Available in	
Live	**Frozen**
√	√

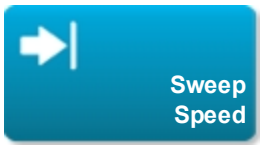
Displays the ECG trace. ECG is available only on the cardiac exam type on the P21xp transducer. See "ECG" on page 311.

Tap this control to display ECG options.

Available in	
Live	**Frozen**
√	

See "Customizing exam types" on page 176.

Available in	
Live	**Frozen**
√	√



Available when displaying the M Mode trace. Sets the sweep speed. Tap this control and then select the speed: **Slow**, **Med**, or **Fast**.

Available in	
Live	**Frozen**
√	

Lets you control the format of the 2D and sweeping images. Tap this control, and then tap the specified format:

- **1/3 2D, 2/3 Sweep**
- **1/2 2D, 1/2 Sweep**
- **2/3 2D, 1/3 Sweep**

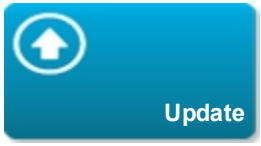
- **Side by Side**
- **Full 2D, Full Sweep**

You can adjust the images independently of each other. To make an image active, tap it, or tap **Update**.

Available in	
Live	**Frozen**
√	√

Provides tools that let you place text, pictographs, and arrows onto an image. See "Labeling images" on page 194.

Available in	
Live	**Frozen**
√	√



Tap the control to toggle between the trace and the 2D pane.

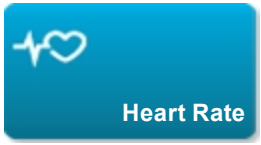
Available in	
Live	**Frozen**
√	√

Controls in frozen M Mode

The following controls are available only in frozen M Mode.

Available when displaying the M Mode trace. Provides calipers to measure distance in centimeters and measure time in seconds.See "Basic measurements in M Mode " on page 205.

Available in	
Live	**Frozen**
	√



Available when displaying the M Mode trace. Provides calipers to measure heart rate. See "Basic measurements in M Mode " on page 205.

Available in	
Live	**Frozen**
	√

Related topics

M Mode imaging 121
Imaging controls 129
Controls in Color 142
Controls in Doppler 157
Controls in 2D 131
Scanning 110
M-line 120

Controls in Doppler

In Doppler imaging, you can adjust controls in D-line (see "Controls in D-line" on page 157) and in scrolling Doppler (see "Controls in scrolling Doppler" on page 165). To specify which controls appear in the Controls bar, see "Imaging controls" on page 129.

Controls in D-line

Note: Some controls in D-line appear only when the image is frozen. See "Controls in frozen D-line" on page 162.

Select **PW** (pulsed wave Doppler), **CW** (continuous wave Doppler), or **PW TDI** (Tissue Doppler Imaging).

CW and **PW TDI** are available only in the Cardiac exam type.

Available in	
Live	**Frozen**
√	

Linear transducers only. Determines the angle of the D-line.

Available in	
Live	**Frozen**
√	

Available only in PW Doppler. Corrects the angle. Tap this control, and then drag the slider or select a setting: **0°**, **+60°**, or **-60°**.You can also adjust the angle by tapping the double-headed arrows on the D-line. See "Scanning" on page 110.

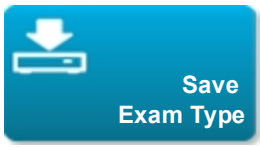
Available in	
Live	**Frozen**
√	√

Tap **Up** to increase the gate size. Tap **Down** to decrease the gate size.

Available in	
Live	**Frozen**
√	

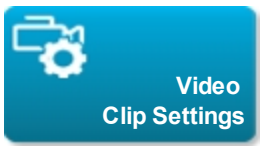
Magnifies the image. See "Zooming" on page 183.

Available in	
Live	**Frozen**
√	√



See "Customizing exam types" on page 176.

Available in	
Live	**Frozen**
√	√



See "To set video clips controls" on page 179.

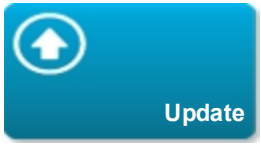
Available in	
Live	**Frozen**
√	

Lets you control the format of the 2D and sweeping images. Tap this control, and then tap the specified format:

- **1/3 2D, 2/3 Sweep**
- **1/2 2D, 1/2 Sweep**
- **2/3 2D, 1/3 Sweep**
- **Side by Side**
- **Full 2D, Full Sweep**

You can adjust the images independently of each other. To make an image active, tap it, or tap **Update**.

Available in	
Live	**Frozen**
√	√



Updates the image. In Dual, tapping the control switches the active side from left to right or right to left. In Doppler or M Mode, tapping the control toggles between the trace and the 2D pane.

Available in	
Live	**Frozen**
√	√

Measures the distance from the skin line to a specified point on the image. For instructions, see "Measuring" on page 202.

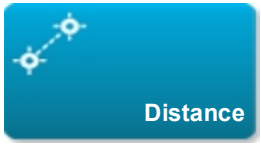
Available in	
Live	**Frozen**
√	√

Provides tools that let you place text, pictographs, and arrows onto an image. See "Labeling images" on page 194.

Available in	
Live	**Frozen**
√	√

Controls in frozen D-line

The following controls are available only in frozen D-line.



Measures the distance between two points.

See "Measuring" on page 202.

Available in	
Live	**Frozen**
	√

Uses an ellipse to measure a region's circumference or area.

See "Measuring" on page 202.

Available in	
Live	**Frozen**
	√

Lets you trace manually to measure an irregular shape.

See "Measuring" on page 202.

Available in	
Live	**Frozen**
	√

See "About calculations " on page 211.

Available in	
Live	**Frozen**
	√

The Acute Care calculations are part of the licensed Acute Care feature. See "Acute Care calculations" on page 259.

Available in	
Live	**Frozen**
	√

Controls in scrolling Doppler

Note: Some controls appear only when the image is frozen. See "Controls in frozen scrolling Doppler" on page 173.

Select **PW** (pulsed wave Doppler), **CW** (continuous wave Doppler), or **PW TDI** (Tissue Doppler Imaging).

CW and **PW TDI** are available only in the Cardiac exam type.

Available in	
Live	**Frozen**
√	

Sets the pulse repetition frequency (PRF). Tap this control, and then tap **Up** or **Down**.

Available in	
Live	**Frozen**
√	

Adjusts the Doppler speaker volume. Tap this control, and then tap **Up** to increase the volume or **Down** to decrease the volume.

Available in	
Live	**Frozen**
√	

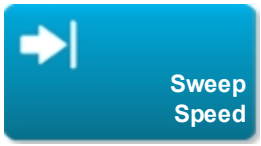
Tap **Up** to increase the gate size. Tap **Down** to decrease the gate size.

Available in	
Live	**Frozen**
√	

Helps to filter out echoes from low frequency signals.

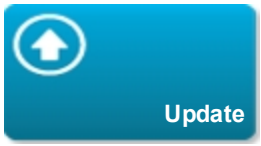
Tap to select the strength of the filter: **Low**, **Med**, or **High**.

Available in	
Live	**Frozen**
√	



Sets the sweep speed. Tap this control and then select the speed: **Slow**, **Med**, or **Fast**.

Available in	
Live	**Frozen**
√	



Tap the control to toggle between the D-line and the trace.

Available in	
Live	**Frozen**
√	√

Lets you control the format of the 2D and sweeping images. Tap this control, and then tap the specified format:

- **1/3 2D, 2/3 Sweep**
- **1/2 2D, 1/2 Sweep**
- **2/3 2D, 1/3 Sweep**
- **Side by Side**
- **Full 2D, Full Sweep**

You can adjust the images independently of each other. To make an image active, tap it, or tap **Update**.

Available in	
Live	**Frozen**
√	√

Sets the baseline position. Tap this control, and then tap **Up** or **Down**.

Available in	
Live	**Frozen**
√	√

Switches the displayed direction of the flow, helping reduce the need of repositioning the transducer.

Tap this control to turn it on (highlighted icon) or off (dimmed icon).

Available in	
Live	**Frozen**
√	√

Corrects the angle. Tap this control, and then drag the slider or select a setting: **0°**, **+60°**, or **-60°**.You can also adjust the angle by tapping the double-headed arrows on the D-line. See "Scanning" on page 110.

Available in	
Live	**Frozen**
√	√

Specifies the Doppler trace setting for measurements. Tap this control, and then tap **Off**, **Peak** (time average peak), or **Mean** (time average mean).

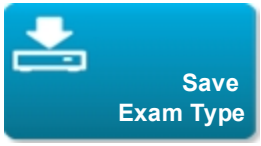
After you tap **Peak** or **Mean** in live imaging, you can choose between **Above**, **Below**, or **All** to control the display relative to the baseline.

Available in	
Live	**Frozen**
√	√

Displays the ECG trace. ECG is available only on the cardiac exam type on the P21xp transducer. See "ECG" on page 311.

Tap this control to display ECG options.

Available in	
Live	**Frozen**
√	



See "Customizing exam types" on page 176.

Available in	
Live	**Frozen**
√	√

Provides tools that let you place text, pictographs, and arrows onto an image. See "Labeling images" on page 194.

Available in	
Live	**Frozen**
√	√

Controls in frozen scrolling Doppler

The following controls are available only in frozen scrolling Doppler.

Displays velocity measurements. See "Basic measurements in Doppler " on page 206.

Available in	
Live	**Frozen**
	√

See "To measure time duration (Doppler)" on page 207.

Available in	
Live	**Frozen**
	√

Lets you trace manually to measure an irregular shape.

See "Measuring" on page 202.

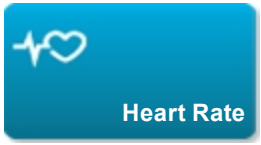
Available in	
Live	**Frozen**
	√

See "To trace automatically (Doppler)" on page 208.

Available in	
Live	**Frozen**
	√

See "About calculations " on page 211.

Available in	
Live	**Frozen**
	√



Provides calipers to measure heart rate.

Available in	
Live	**Frozen**
	√

Related topics

Imaging controls 129
Controls in Color 142
Controls in M Mode 151
Controls in 2D 131
Doppler imaging 126
Scanning 110
D-line 125

Customizing exam types

You can customize, or *define*, any exam type to use your favorite settings. When you select the new exam type (that is, the *user-defined exam type*) the system automatically uses the settings you specified.

The system displays user-defined exam types along with the original exam types in the transducer-selection lists.

You can customize up to five exam types for each exam type/ transducer combination. For example, you can customize five different exam types for Abdomen on the P21xp transducer and five different exam types for Abdomen on the C60xp transducer.

You can rename, delete, export, show, hide, reorder, and import user-defined exam types. See "Presets settings" on page 60.

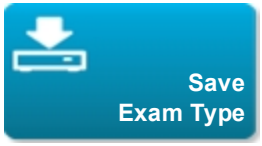
To customize an exam type

1 Select a transducer and exam type (see "Selecting a transducer and exam type" on page 20).

2 Adjust imaging controls to your favorite settings.

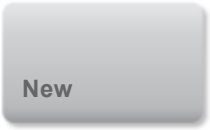
You can set gain, AutoGain adjust, depth, dynamic range, image orientation, sweep speed, color settings, color Doppler type, Doppler invert, Doppler angle correct, wall filter level, scale, baseline, audio volume level, optimization, and trace settings.

3 Tap **Save Exam Type**.



If this control is hidden, tapping **More Controls** displays it.

4 In the **Save User-Defined Exam** window, tap **New**.

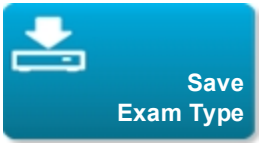


5 Type a name for the exam type in the Exam box, and then tap **Save**. The exam type must have a unique name.

To modify a user-defined exam type

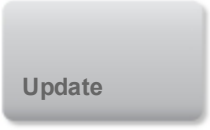
1 Adjust imaging controls to the new settings.

2 Tap **Save Exam Type**.



If this control is hidden, tapping **More Controls** displays it.

3 In the **Save User-Defined Exam** window, select the exam type and tap **Update**.



The current settings overwrite the previously saved settings.

Saving images and video clips

You can save images and video clips to internal storage. The system plays a sound if Beep Alert is on (see "Audio settings" on page 39), and the Save in Progress icon briefly appears on the clinical monitor.

The system limits the maximum number of images and video clips that you can save for an individual exam, and warns you when this limit is reached.

You can also save a labeled frame from a video clip. See "Labeling during review" on page 198.

To review saved images and video clips for the current patient, tap **REVIEW**. For patients whose exams have ended, then you must go to the Patient List by tapping **REVIEW**and then **Patient List**. See "Reviewing" on page 294.

You can also save images from cine while the system is frozen.

Saving images

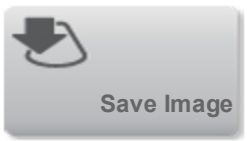
To avoid mixing images saved from multiple patients, make sure that the patient ID is displayed before you save an image. See "Entering patient information" on page 76 and "Display Information settings" on page 57.

To save an image

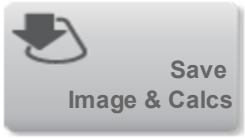
If the **Save Image** or **Save Image & Calcs** control is not available, configure the system to display it. See "To configure custom controls" on page 65.

♦ Do either of the following:

- To save only the image, tap **Save Image**.



- To save the image and to save the current calculation to the patient report, tap **Save Image & Calcs**.

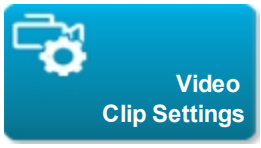


Note: You can also configure the footswitch to save (see "User profile settings" on page 64).

Saving video clips

To set video clips controls

1 Tap **Video Clip Settings**.



If this control is hidden, tapping **More Controls** displays it.

2 Set the following as desired:

- **Clip Method**

  Prospective captures frames after you tap **Save Video Clip**. The system captures frames for the number of seconds you specify in the **Time** list.

  Retrospective captures frames from presaved data available before you tap **Save Video Clip**. The system captures presaved frames for the number of seconds you specify in the **Time** list.

  The system displays in the system status area when you save a video clip prospectively. If Restrospective is selected in Video Clip Settings, the system displays in the system status area.

- **Clip Type**

  Time captures based on number of seconds. Select the time duration from the **Time** list.

  ECG captures based on the number of heart beats. Select the **R-Wave Count**.

- **Preview Video Clip**

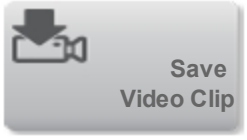
  Select this option to automatically play and optionally trim a captured video clip (the video clip does not save automatically to internal storage). If this option is deselected, the video clip saves to internal storage, and trim controls are not available.

3 Tap **Done**.

To capture and save a video clip

1 Make sure that video clips settings are set as desired. See "To set video clips controls" on page 179.

2 Tap **Save Video Clip**.



Note: You can also configure the footswitch to save a video clip (see "User profile settings" on page 64).

If **Clip Method** is set to **Retrospective**, the system captures presaved frames for the number of seconds you specify in the **Time** list and, if Beep Alert is on (see "Audio settings" on page 39), beeps when acquisition is complete.

If **Clip Method** is set to **Prospective**, the system beeps if Beep Alert is on (see "Audio settings" on page 39), captures frames for the number of seconds you specify in the **Time** list, and then beeps again. Tap **Stop Video Clip** to end capture before the number of seconds specified in the **Time** list.

If **Preview Video Clip** is selected in **Video Clip Settings**, the video clip automatically begins playing on the clinical monitor.

3 (Optional, Preview Video Clip only) Trim the video clip:

a Tap .

b Drag the trim sliders to remove frames from the left or right sides of the video clip.

c Tap **Save**.

Note: Tapping **Done** *discards the video clip.*

Viewing the cine buffer

While imaging, X-Porte always retains a certain number of frames in the *cine buffer.* You can move forward and backward in the cine buffer.

The system clears the cine buffer when you unfreeze the image.

You can view frames in the cine buffer in Dual. See "Dual" on page 112.

To view frames in the cine buffer

1 Freeze the image.

2 Do either of the following:

- Drag the slider. Right moves forward, and left moves backward.
- Tap or to move forward or backward through frames one at a time.

The current frame number appears on the touch panel. The frame number changes as you move forward or backward.

Managing internal storage space

The save available icon

in the system status area shows the percentage of space available in internal storage.

To receive alerts when storage is near capacity, see "Connectivity settings" on page 51.

If you try to save an image or video clip when space is low, the system alerts you that internal storage is low and prompts you to delete archived or storage committed patient exams.

If memory is full, the system displays the Memory Full icon .

Related topics

Audio settings 39
Reviewing 294
Archiving and exporting 303

Zooming

You can zoom in on a 2D image in 2D, M Mode, Doppler, and Color imaging. You can freeze or unfreeze the image or change the imaging mode while zooming.

When you zoom in on an image, the Zoom icon appears on the image.

To zoom in live imaging

1 Tap **Zoom**.

A zoom box appears.

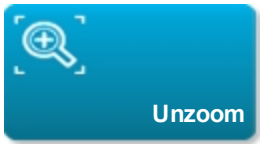
If this control is hidden, tapping **More Controls** displays it.

2 Size and position the zoom box over the area that you want to zoom:

- To size, pinch or spread the box, or drag .
- To position, drag the box.

3 Double-tap in the zoom box, or tap **Zoom**.

To exit zoom, double-tap in the zoom box, or tap **Unzoom**.



To zoom in Color

1 Position the Color box over the area you want to zoom.

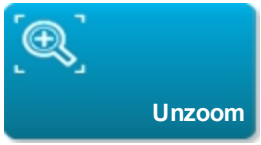
2 Tap **Zoom**.

If this control is hidden, tapping **More Controls** displays it.

The area in the box is magnified.

Note: To change zoom magnification, you must first shrink your color box.

To exit zoom, double-tap in the zoom box, or tap **Unzoom**.



To zoom in on a frozen image

1 Tap **Zoom**.

If this control is hidden, tapping **More Controls** displays it.

2 Do any of the following:

- Tap **4x** or **2x**. To unzoom, tap **Off**.
- Drag the slider. To unzoom, drag the slider to **1.0**.

3 (Optional) Pan the image by dragging left, right, up, or down.

Note: You cannot pan the image if measurements, text, arrows, or labels exist on the image.

Freezing

Before performing certain tasks, such as viewing the cine buffer or measuring, you stop live imaging or *freeze* the image.

When you freeze the image, you can perform calculations. See "About calculations " on page 211.

To freeze the image

♦ Do either of the following:

- Tap **FREEZE**.

- With two or more fingers, double-tap the touch panel.

Additional features appear on the image.

Note: You can also configure the footswitch to freeze (see "User profile settings" on page 64).

To unfreeze the image

♦ Do either of the following:

- Drag or swipe the **Slide to Unfreeze** slider to the right.
- With two or more fingers, double-tap the touch panel.

Related topics

About calculations 211

Adjusting depth and gain

Depth

Depth refers to the depth of display. You can adjust the depth in all imaging modes except M Mode trace and Doppler trace. The vertical depth scale on the touch panel lists all available depth levels for the current transducer. The intervals depend on the active transducer.

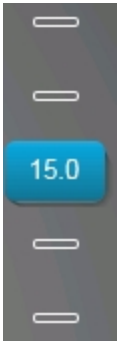
To adjust the depth

As you adjust the depth, the depth value appears in a rectangle in the lower right corner of the image area or upper right corner if the image orientation is upside down.

Note: The depth value in the lower right corner of the clinical monitor is always the total acquired depth of the unzoomed image. When you zoom, this value stays the same.

♦ Do either of the following on the touch panel:

- Tap a marker on the depth scale.
- Drag the depth scale.



Gain

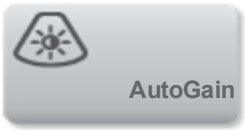
Gain refers to amplifying the intensity of the returning sound waves on the screen display. Increasing the gain brightens the image. Decreasing the gain darkens the image.

There are two ways to adjust gain: automatically and by using the gain sliders.

To adjust gain automatically

♦ Tap **AutoGain**.

Note: The **AutoGain** *control is present only if enabled as a custom control. See "User profile settings" on page 64.*



The system automatically balances the gain each time you tap this control. You can adjust the Auto Gain level by using the **AutoGain Adjust** control: see "Controls in 2D" on page 131.

To adjust gain by using the gain sliders

♦ Drag a slider left or right, to decrease or increase the gain respectively:

- In Color or Doppler, drag the **C** (Color) or the **D** (Doppler) gain slider at the bottom of the touch panel.
- In 2D or M Mode, tap the gain slider or the **M** (M Mode) gain slider at the bottom of the touch panel. Two additional sliders appear.
    - The upper slider adjusts the near gain of the 2D image, controlling the display intensity in the near field (nearer to the transducer).
    - The middle slider adjusts the far gain of the 2D image, controlling the display intensity in the far field (further from the transducer).
    - The lower slider adjusts the overall gain.

Note: Near and Far correspond to the time gain compensation (TGC) controls on some other ultrasound systems.

Visualizing needles

Warning: To avoid incorrect needle placement when Needle Profiling is on:
· Using movement and fluid injection, verify the needle-tip location and trajectory. Needle Profiling enhances linear structures within a selected angle range on the ultrasound plane. Linear structures outside the selected angle range or the ultrasound plane—such as a bent needle—may be less apparent.

· Note that linear structures are enhanced only in an outlined portion of the image. The area outside the outline remains unchanged.

X-Porte features Steep Needle Profiling technology, which can facilitate needle guidance during catheter placement and nerve-block procedures. This technology enhances linear structures within an outlined area on the screen. Linear structures are best enhanced when perpendicular to the angle guide.

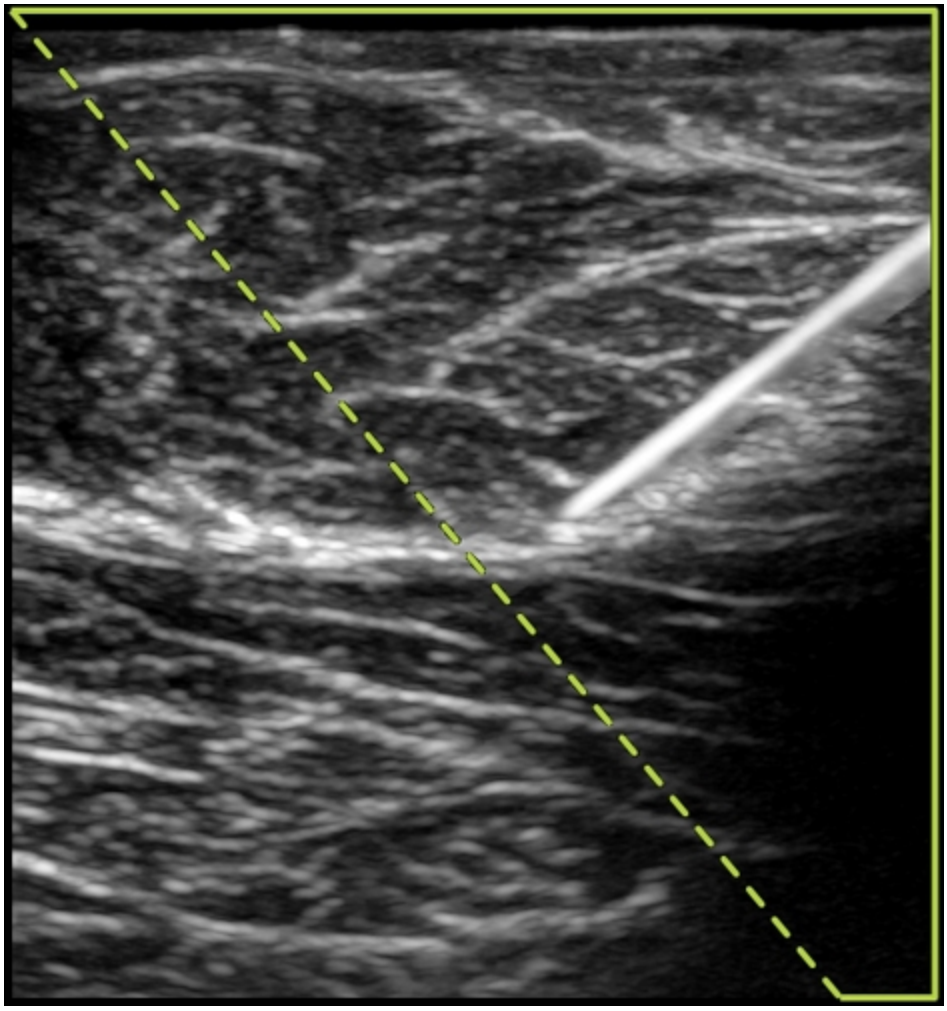


Image with Steep Needle Profiling on. The area within the green trapezoidal outline is the enhancement area.

Steep Needle Profiling is available in 2D full-screen imaging only and on the following exam types.

Transducer	Breast	Musculoskeletal	Nerve	Small Parts	Venous
HFL50xp	√	√	√	√	
L25xp			√		√
L38xp			√		√

To use Steep Needle Profiling (basic steps)

1 In 2D imaging, tap **Needle Profiling**.

If this control is hidden, tapping **More Controls** displays it.

2 Ensure that the target is within the enhancement area (that is, within the outline) and that the needle, when inserted, will approach the angle guide (dashed line) perpendicularly.

- Tap Left or Right if you need to flip the image horizontally.

- Tap **Shallow**, **Medium**, or **Steep** to select a needle angle.

  The needle angle sets the angle guide (dashed angled line).

  Linear transducer: Use whichever setting best provides a perpendicular intersection with the angle guide. Within the enhancement area, the more perpendicular that a linear structure is to the angle guide, the more it is enhanced. Similarly, the less perpendicular (and more parallel) that a linear structure is to the angle guide, the less it is enhanced.

3 Insert the needle toward the angle guide.

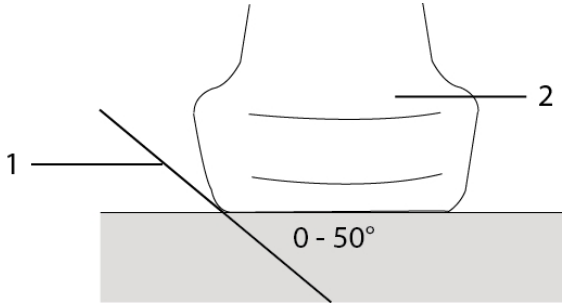
4 (Optional) Tap **Off** to turn off Needle Profiling.

Temporarily turning off Needle Profiling can help you identify artifacts and other structures not of interest. Tap **On** to turn it on again.

Needle size and angle

Use a 17-gauge to 25-gauge needle (recommended). Enhancement results can depend on the type and brand of needle used. For more information, consult the medical literature on needle visibility in ultrasound-guided procedures.

You can angle the needle up to 50° from the transducer surface. Beyond 50°, the needle may be less enhanced. (Needle Profiling has little or no benefit to out-of-plane procedures. Needle Profiling is intended for in-plane procedures only.)



For best results, angle the needle only up to 50° from the transducer surface.

1. *Needle*
2. *Transducer*

Additional recommendations

Avoid setting the gain too high when using Needle Profiling, as unnecessarily high gain can cause artifacts in the image. Also, respiratory and cardiac movement in the image may cause bright pulsating artifacts.

Labeling images

You can label live, frozen, or saved images. You can label in full-screen 2D, full-screen trace, dual, or duplex. You can place text (including predefined labels), arrows, and pictographs.

To set preferences for labels, including predefined text labels, see "Presets settings" on page 60.

TIP: If you select **Clear Labels on Unfreeze** *in the Presets setup page, the system clears all labels from an image when you unfreeze the image.*

Text

You can add text manually or add a predefined label.

Note: If you zoom or pan an image, the system removes text labels and arrows from the image.

To place text on an image

1 Tap **Label**.

If this control is hidden, tapping **More Controls** displays it.

2 Tap **Text** and do any of the following:

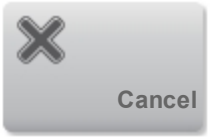
- To specify that text and predefined labels connect when you enter them, instead of being placed separately, tap . Tap to insert text and predefined labels separately.
- To place text manually, tap in the field at the top of the form, type text, and then tap **Done**.

- To add one or more predefined labels, tap them and then tap **Done**.

TIP: To replace a label you've added with another label, tap the added label and then tap the label that you want to replace the added label with.

- To place text manually and add a predefined label, type text in the field at the top of the form, tap in the field again, and then tap one or more predefined labels. Tap **Done**.
- To clear text or predefined labels, tap **Clear**.

- To undo changes and return to the image, tap **Cancel**.

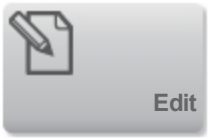


- To undo changes and return to 2D imaging, tap **2D**.

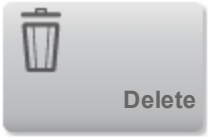
3 Drag the text label to the desired location.

4 Make changes as needed:

- To edit the text, select it in the **Label** list and tap **Edit**.



- To remove the text, select it in the **Label** list and tap **Delete**.



- To remove all text labels, tap **Remove All Text** in the **Label** list.

Arrows

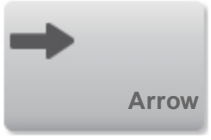
You can add an arrow graphic to point out a specific part of the image. The system deletes arrows from the image when you zoom, pan, or unfreeze the image.

To place an arrow on an image

1 Tap **Label**.

If this control is hidden, tapping **More Controls** displays it.

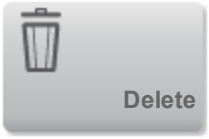
2 Tap **Arrow**.



3 Position and orient the arrow:

- To position the arrow, drag it.
- To orient the arrow, drag the circle's edge.

To remove the arrow, select it and then tap **Delete** in the **Arrow** list.



Pictographs

The pictograph set available depends on transducer and exam type. Each pictograph you place includes a transducer orientation icon.

To place a pictograph on an image

1 Tap **Label**.

If this control is hidden, tapping **More Controls** displays it.

2 Tap **Picto**.

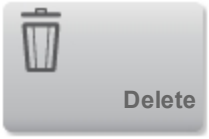
3 Tap the desired pictograph, and then tap **Done**.

4 Drag the pictograph to the desired location.

5 Position and orient the transducer orientation icon:

- To position the icon, drag it.
- To orient the icon, drag the circle's edge.

To remove the pictograph, select it, and then tap **Delete** in the **Picto** list.



Setting the home position

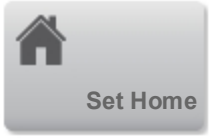
The home position is the position in which the system places labels by default.

To reset the home position

1 Place text on an image.

2 Drag the label to the desired home position.

3 Tap **Set Home** in the **Label** list.



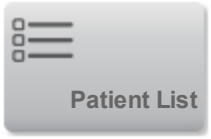
Labeling during review

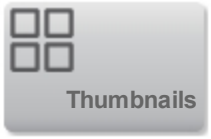
You can label images during review. You can also label a frame from a video clip during review.

To review images and video clips

1 Tap **REVIEW**, and then do either of the following:

- Review the current exam.
- Review a completed exam: Tap **Patient List**. In the patient list, select the exam, and then tap **Thumbnails**.

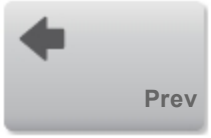


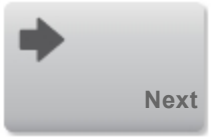


To label in review

1 In Review, tap the image or video clip you want to label:

To view the previous or next image or video clip, tap **Prev** or **Next**.





2 (Video clips only) Tap , and then drag the slider to the frame you want to label.

3 Tap **Labels** .

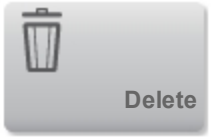
4 Do one of the following:

- Place the label:
  - For text, see "To place text on an image" on page 194.
  - For an arrow, see "To place an arrow on an image" on page 196.
  - For a pictograph, see "To place a pictograph on an image" on page 197.

  Note: If you play a video clip, the system removes labels applied to the current frame.

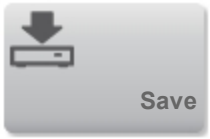
- Cover an existing label: tap **Labels**, and then tap **Mark Out**. The system places a black rectangle on the image.

  - To reposition the Mark Out box, drag it.
  - To resize the Mark Out box, drag the round handle at the corner of the Mark Out box.
  - To delete the Mark Out box, select the Mark Out box in the **Mark Out** list and then tap **Delete**.

  The system displays the image or video clip in full-screen mode.

5 Tap **Save**.



The system saves the labeled image to the exam.

6 Tap **Done** to exit labels and return to review.

Related topics

Reviewing 294
Presets settings 60

Measuring

X-Porte offers several types of measurements.

You can perform independent measurements, or you can perform a measurement and then assign it to a calculation. (See "Assigning measurements to calculations" on page 210.) If you want to save a measurement, you must assign it to a calculation (which saves results to the patient report), or you can save the image with the calipers displayed.

If you prefer to start within a calculation, see "About calculations " on page 211.

Calipers

You perform most measurements by using calipers that you drag into position. The active caliper has a round highlighted handle .

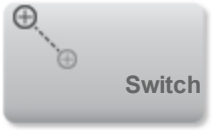
To activate calipers

♦ Tap the caliper.

To switch between calipers

♦ Do either of the following:

- Tap either caliper.
- Tap **Switch** beneath the measurement result on the left side of the touch panel.



- Tap the caliper under **Measure**.

Viewing and deleting measurement results

The current measurement result appears on the left side of the touch panel under **Measure**. To assign it to a calculation, see "Assigning measurements to calculations" on page 210.

If you perform multiple measurements, tapping an entry under **Measure** highlights the corresponding calipers on the image.

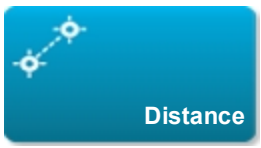
To delete a measurement

♦ Tap the measurement under **Measure**, and then tap **Delete**.

Basic measurements in 2D

To measure the distance between two points (2D)

1 On a frozen image, tap **Distance**.



A caliper appears.

If this control is hidden, tapping **More Controls** displays it.

2 Drag the active caliper to the first point.

3 Drag the other caliper to the second point.

4 As needed, tap and drag each caliper until it is precisely positioned.

To measure circumference or area using an ellipse (2D)

1 On a frozen image, tap **Ellipse**.

If this control is hidden, tapping **More Controls** displays it.

An ellipse with three calipers appears.

2 Position and resize the ellipse:

- To position, drag the calipers.
- To resize, drag the calipers, the empty handle, or both.

To measure circumference or area by tracing (2D)

1 On a frozen image, tap **Trace**.

If this control is hidden, tapping **More Controls** displays it.

A caliper appears.

2 Drag the caliper to the start point, and then tap **Set**.

3 Drag the caliper around the area you want to trace.

To make a correction, trace backward on the dotted line.

4 Do one of the following:

- To save the measurement and close the trace, tap **Save**.
- To close the trace, tap **Close**.

To perform a Target Depth measurement (2D)

You can measure the distance from the skin line to a specified point on the image.

1 On a 2D image, tap **Target Depth**.

If this control is hidden, tapping **More Controls** displays it.

A dotted line appears from the skinline and with a single caliper at the end.

2 Drag the caliper to the desired location.

Basic measurements in M Mode

To measure distance and time (M Mode)

You can measure distance in centimeters and measure time in seconds.

1 On a frozen M Mode trace, tap **Distance Time**.

If this control is hidden, tapping **More Controls** displays it.

A caliper appears.

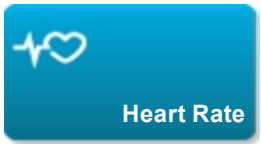
2 Drag the caliper to the desired location.

A second caliper appears.

3 Drag the second caliper to the desired location.

To measure heart rate (M Mode)

1 On a frozen M Mode trace, tap **Heart Rate**.



A vertical caliper appears.

If this control is hidden, tapping **More Controls** displays it.

2 Drag the caliper to the peak of the heartbeat.

A second vertical caliper appears.

3 Drag the second caliper to the peak of the next heartbeat.

Saving the heart rate measurement to the patient report overwrites any heart rate entered on the patient form.

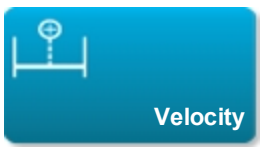
Basic measurements in Doppler

The basic measurements that you can perform in Doppler imaging are Velocity (cm/s), Pressure Gradient, Elapsed Time, +/x Ratio, Resistive Index (RI), and Acceleration. You can also trace a waveform manually or automatically.

For Doppler measurements, the Doppler scale must be set to cm/s. See "Presets settings" on page 60.

To measure Velocity (cm/s) and Pressure Gradient (Doppler)

1 On a frozen Doppler spectral trace, tap **Velocity**.



A single caliper appears.

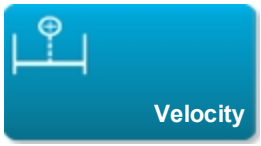
If this control is hidden, tapping **More Controls** displays it.

2 Drag the caliper to a peak velocity waveform.

This measurement involves a single caliper from the baseline.

To measure Velocities, Elapsed Time, +/x Ratio, Resistive Index (RI), and Acceleration (Doppler)

1 On a frozen Doppler spectral trace, tap **Velocity**.



A single caliper appears.

If this control is hidden, tapping **More Controls** displays it.

2 Drag the caliper to a peak systolic waveform.

3 Tap **Velocity**.

A second caliper appears.

4 Drag the second caliper to the end diastole on the waveform.

To measure time duration (Doppler)

1 On a frozen Doppler spectral trace, tap **Time**.

A vertical caliper appears.

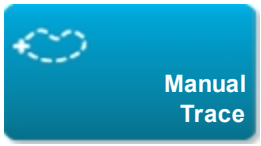
If this control is hidden, tapping **More Controls** displays it.

2 Drag the caliper where desired.

3 Drag the second caliper where desired.

To trace manually (Doppler)

1 On a frozen Doppler spectral trace, tap **Manual Trace**.



If this control is hidden, tapping **More Controls** displays it.

A single caliper appears.

2 Drag the caliper to the beginning of the desired waveform, and tap **Set**.

If calipers are not positioned correctly, the result is inaccurate.

3 Drag the caliper to trace the waveform.

To make a correction, trace backward on the dotted line.

4 Tap **Close**.

The measurement results appear.

To trace automatically (Doppler)

After tracing automatically, confirm that the system-generated boundary is correct. If you are not satisfied with the trace, obtain a high-quality Doppler spectral trace image, or trace manually.

1 On a frozen Doppler spectral trace, tap **Auto Trace**.

If this control is hidden, tapping **More Controls** displays it.

A vertical caliper appears.

2 Drag the caliper to the beginning of the waveform.

If calipers are not positioned correctly, the calculation result is inaccurate.

3 Drag the second caliper to the end of the waveform, and tap **Done**.

The measurement results appear.

Automatic trace results

Depending on the exam type, the results from automatic tracing include the following:

- Velocity Time Integral (VTI)
- Peak Velocity (Vmax)
- Mean Pressure Gradient (PGmean)
- Mean Velocity on Peak Trace (Vmean)
- Pressure Gradient (PGmax)
- Cardiac Output (CO)
- Peak Systolic Velocity (PSV)
- Time Average Mean (TAM)*
- +/× or Systolic/Diastolic (S/D)
- Pulsatility Index (PI)
- End Diastolic Velocity (EDV)

- Acceleration Time (AT)
- Resistive Index (RI)
- Time Average Peak (TAP)
- Gate Depth

** The automatic trace tool must be used to calculate the TAM.*

Assigning measurements to calculations

You can assign a measurement to a calculation that includes that measurement type.

When you assign a measurement to a calculation, a checkmark appears next to the measurement indicating that it has been successfully saved.

To assign a measurement to a calculation

1 After performing the measurement, select it, and tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

Note: If **Calcs** *is unavailable, the measurement is unavailable for saving to a calculation.*

A calculation list appears, along with a list of additional available lists.

2 Tap the desired calculation list.

3 Tap the desired measurement name in the calculation list.

4 Save the measurement: Tap **Save** under the measurement name.

A checkmark appears next to the measurement name.

About calculations

Warning: To avoid incorrect calculations, verify that the patient information, date, and time settings are accurate.

Warning: To avoid misdiagnosis or harming the patient outcome, start a new patient form before starting a new patient exam and performing calculations. Starting a new patient form clears the previous patient's data. The previous patient's data will be combined with the current patient if the form is not first cleared. See "Entering patient information" on page 76.

Warning: To avoid misdiagnosis or harming the patient outcome, do not use single calculations as sole diagnostic criteria. Use calculations in conjunction with other clinical information.

In X-Porte you can perform calculations, whose results save to the patient report. (See "Worksheets and reports" on page 286.)

There are three kinds of calculations:

- Basic calculations that are available in multiple exam types:
  - Volume calculations
  - Volume Flow calculations
  - Percent reduction calculations
- Specialized calculations that are specific to one exam type:
  - Arterial calculations
  - Cardiac calculations
  - Gynecology calculations
  - Obstetrical calculations
  - Small Parts calculations
- Acute Care calculations, included with the Acute Care worksheets licensed feature.

Overview

Calculations are accessed from the *calculation lists*, which you display by tapping the **Calcs** control (for basic and specialized calculations) or **Acute Care** control (for Acute Care calculations), typically on a frozen image.

If these controls are hidden, tapping **More Controls** displays them.

After you tap the control, a calculation list appears on the left side of the touch panel. If the measurement you want to perform is in a different list, you can select that list (see "To select calculation lists" on page 212).

Tapping collapses the list contents. Tapping expands them.

After you select a measurement name, it is highlighted and has **Save** and **Delete** controls, and calipers appear on the image.

You position the calipers by dragging. The measurement result appears beside the measurement name. After you save measurements, the calculation result appears on the clinical monitor.

If there are mutiple saved measurements for a calculation, the system numbers them in the order they were completed in the calculation list on the left side of the touch panel.

To select calculation lists

If the measurement you want to perform is in a different list, you can select that list.

1 Tap at the top of the current list.

2 Tap the desired list.

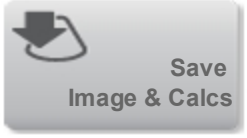
To save calculation measurements

When you save a measurement, a checkmark appears next to the measurement, indicating that the value has been saved.

♦ With one or more measurements on the screen, do any of the following:

- Save the selected measurement: Tap **Save** under the measurement name.
- Save all the measurements in a given set: Tap **Save Set**.
- Save all performed measurements in the calculation: Tap **Save All**.

- Save both the selected measurement and the image: Tap **Save Image & Calcs**. (If the **Save Image & Calcs** control is not available, configure the system to display it (see "User profile settings" on page 64)).



To redo or delete a saved measurement

1 On a frozen image, tap **Calcs** or, for the Acute Care calculations, tap **Acute Care**.

If these controls are hidden, tapping **More Controls** displays them.

2 In the calculation list that contains the measurement, do one of the following:

- To redo, perform the measurement again.

  To save the new measurement, tap **Save** under the measurement name. The new measurement saves to the patient report and appends the new measurement to the calculation list.

- To delete, tap **Delete** under the measurement name.

  The measurement last saved is deleted from the patient report. If it is the only measurement, the result is deleted from the report.

  Some measurements can be deleted directly from the report preview. See "Worksheets and reports" on page 286.

Related topics

Freezing 186

Volume calculation

Warning: To avoid incorrect calculations, verify that the patient information, date, and time settings are accurate.

Warning: To avoid misdiagnosis or harming the patient outcome, start a new patient form before starting a new patient exam and performing calculations. Starting a new patient form clears the previous patient's data. The previous patient's data will be combined with the current patient if the form is not first cleared. See "Entering patient information" on page 76.

The volume calculation involves three 2D distance measurements: Height, Width, and Length. You can calculate volume on one, two, or all three distance measurements. After any measurement is saved, the result appears on the clinical monitor and in the patient report.

The volume calculation is available in the following exam types: Abdomen, Arterial, Breast, Gynecological, Musculoskeletal, Nerve, Small Parts, Superficial.

For a list of exam types on each transducer, see "Selecting a transducer and exam type" on page 20.

To calculate volume

♦ Do the following for each image you need to measure:

a On the frozen 2D image, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

b On the **Volume 1**, **Volume 2**, or **Volume 3** calculation list, do the following for each measurement you need to take:

i Tap the measurement name.

ii Position the calipers by dragging.

iii Save the measurement.

Volume flow calculation

Warning: To avoid incorrect calculations, verify that the patient information, date, and time settings are accurate.

Warning: To avoid misdiagnosis or harming the patient outcome, start a new patient form before starting a new patient exam and performing calculations. Starting a new patient form clears the previous patient's data. The previous patient's data will be combined with the current patient if the form is not first cleared. See "Entering patient information" on page 76.

Volume flow calculations are available in the following exam types: Abdomen, Arterial.

For a list of exam types on each transducer, see "Intended uses " on page 27.

Required measurements

Calculation list	Measurement name (imaging mode)	Calculation result
Volume Flow	• Diam (2D)* • TAM or TAP (Doppler)	Vol Flow (Volume Flow ml/min)

** Required if measuring the diameter instead of using the sample volume size*

Both a 2D and a Doppler measurement are required for the volume flow calculation. For the 2D measurement, you can do either of the following:

- Measure the diameter of the vessel. This approach is more precise. The measurement overrides the sample volume size.
- Use the sample volume size. If you do not measure the diameter of the vessel, the system automatically uses the sample volume size and "(Sample Volume)" appears in the calculation results.

The Doppler sample volume should completely insonate the vessel. You can measure either the time average mean (TAM) or time average peak (TAP). To specify, see "Controls in Doppler" on page 157.

Considerations

Consider the following factors when performing volume flow measurements:

- You should follow current medical practice for volume flow calculation applications.
- The accuracy of the volume flow calculation largely depends on the user.
- The factors identified in the literature that affect the accuracy are as follows:
  - Using the diameter method for 2D area
  - Precision in placing the caliper
  - Difficulty ensuring uniform insonation of the vessel

For more information about the considerations and degree of accuracy for volume flow measurements and calculations, see the following reference:

Allan, Paul L. et al. *Clinical Doppler Ultrasound,* 4th Ed., Harcourt Publishers Limited, (2000) 36-38.

To calculate volume flow

1 If measuring the diameter instead of using the sample volume size, perform the 2D measurement:

a On a frozen full-screen 2D image or duplex image, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

b On the **Volume Flow** calculation list, tap **Diam**.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

c Position the calipers by dragging.

d Tap **Save** under the measurement name.

2 Perform the Doppler measurement:

a If full-screen imaging, start and then freeze the Doppler spectral trace.

b On the **Volume Flow** calculation list, tap **TAM** or **TAP**.

A vertical caliper appears.

c Drag the vertical caliper to the beginning of the waveform.

A second vertical caliper appears.

If calipers are not positioned precisely, the calculation result is inaccurate.

d Drag the second vertical caliper to the end of the waveform, and tap **Done**.

e If you need to reposition either caliper, tap it (or tap its name in the calculation list) to make it active, drag it where desired, and then tap **Done**.

f Tap **Save** under the measurement name.

Results appear on the clinical monitor and save to the patient report.

Percent reduction calculations

Warning: To avoid incorrect calculations, verify that the patient information, date, and time settings are accurate.

Warning: To avoid misdiagnosis or harming the patient outcome, start a new patient form before starting a new patient exam and performing calculations. Starting a new patient form clears the previous patient's data. The previous patient's data will be combined with the current patient if the form is not first cleared. See "Entering patient information" on page 76.

Percent reduction calculations are available in the following exam types: Abdomen, Arterial, Musculoskeletal, and Small Parts.

For a list of exam types on each transducer, see "Selecting a transducer and exam type" on page 20.

To calculate percent area reduction

1 On a frozen 2D image, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 In the Area Reduction calculation list, do the following for A^1 and then for A^2:

To select a calculation list, tap at the top of the current list, and then tap the desired list.

a Tap the measurement name.

b Drag the caliper to the trace starting point, and then tap **Set**.

c Trace the desired area.

To make a correction, trace backward on the dotted line.

d Complete the trace, and then do one of the following:

- To save the measurement and close the trace, tap **Save**.
- To close the trace, tap **Close**.

The percent area reduction result appears on the clinical monitor and saves to the patient report.

To calculate percent diameter reduction

1 On a frozen 2D image, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 On the Diameter Reduction calculation list, do the following for D^1 and then for D^2:

To select a calculation list, tap at the top of the current list, and then tap the desired list.

a Tap the measurement name.

b Position the calipers by dragging.

c Save the measurement.

The percent diameter reduction result appears on the clinical monitor and saves to the patient report.

Arterial calculations

Warning: To avoid incorrect calculations, verify that the patient information, date, and time settings are accurate.

Warning: To avoid misdiagnosis or harming the patient outcome, start a new patient form before starting a new patient exam and performing calculations. Starting a new patient form clears the previous patient's data. The previous patient's data will be combined with the current patient if the form is not first cleared. See "Entering patient information" on page 76.

The Arterial calculations that you can perform are listed in the table below.

In the Arterial exam, you can also calculate ICA/CCA ratio, volume, volume flow, and percent reduction. See "Volume calculation" on page 215, "Volume flow calculation" on page 217, and "Percent reduction calculations" on page 220.

Calculation list	Measurement name
Right	CCA • Proximal • Middle • Distal • Bulb
	ICA • Proximal • Middle • Distal
	ECA

Calculation list	Measurement name
	• Proximal • VA
Left	CCA • Proximal • Middle • Distal • Bulb
	ICA • Proximal • Middle • Distal
	ECA • Proximal • VA

Calculation results for each measurement include s (systolic) and d (diastolic).

To perform an Arterial calculation

1 On a frozen Doppler spectral trace, tap **Calcs**.

2 Do the following for each measurement you want to take:

a Select the calculation list that contains the measurement name.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

b Drag the caliper to the peak systolic waveform, and tap **Next**.

A second caliper appears.

c Drag the caliper to the end diastole point on the waveform.

d Tap **Save** or **Save Set** under the measurement name.

Cardiac calculations

Warning: **To avoid incorrect calculations, verify that the patient information, date, and time settings are accurate.**

Warning: **To avoid misdiagnosis or harming the patient outcome, start a new patient form before starting a new patient exam and performing calculations. Starting a new patient form clears the previous patient's data. The previous patient's data will be combined with the current patient if the form is not first cleared. See "Entering patient information" on page 76.**

Warning: **Moving the baseline, scrolling, or inverting the trace while frozen clears the displayed results.**

In the Cardiac exam, you can perform the following calculations:

Measurements required to complete Cardiac calculations

Note: These tables are organized to show calculation results. The order of items in the calculation lists on the system may differ somewhat.

Calculation list	Measurement name (imaging mode)	Results
LV	Diastole (2D or M Mode) • RVWd (2D or M Mode) • RVDd (2D or M Mode) • IVSd (2D or M Mode) • LVDd (2D or M Mode) • LVPWd (2D or M Mode) Systole • RVWs (2D or M Mode) • RVDs (2D or M Mode)	CO CI EF SV SI LVESV LVEDV IVS LVPWFT

Calculation list	Measurement name (imaging mode)	Results
	• IVSs (2D or M Mode) • LVDs (2D or M Mode) • LVPWs (2D or M Mode) *HR[a] needed for CO & CI* **If measurements taken in M Mode.*	LVDFS LV Mass*

Calculation list	Measurement name (imaging mode)	Results
Ao/LA	Ao (2D or M Mode)	Ao LA/Ao
	LA (2D or M Mode)	LA LA/Ao
	AAo (2D)	AAo
	LVOT D (2D)	LVOT D LVOT area
	ACS (M Mode)	ACS
	LVET (M Mode)	LVET

Calculation list	Measurement name (imaging mode)	Results
MV	E-F Slope (M Mode)	E-F SLOPE
	EPSS (M Mode)	EPSS

Calculation list	Measurement name (imaging mode)	Results
MV/MR	MV	E

Calculation list	Measurement name (imaging mode)	Results
	• E (Doppler) • A (Doppler)	E PG A A PG E:A
	• PHT (Doppler)	PHT MVA Decel
	• MV VTI (Doppler)	VTI Vmax PGmax Vmean PGmean
	• IVRT (Doppler)	time
	• Adur (Doppler)	time
	MR • dP:dT[b] (CW Doppler)	 dP:dT

Calculation list	Measurement name (imaging mode)	Results
Area	MVA (2D)	MV Area
	AVA (2D)	AV Area

Calculation list	Measurement name (imaging mode)	Results
LV Vol	A4Cd (2D) A4Cs (2D) A2Cd (2D) A2Cs (2D)	LV Vol LV Area EF CO SV CI SI Biplane d Biplane s

Calculation list	Measurement name (imaging mode)	Results
LV Mass	Epi (2D) Endo (2D) Apical (2D)	LV Mass Epi Area Endo Area D Apical

Calculation list	Measurement name (imaging mode)	Results
AV/LVOT/AI	AV • VMAX (Doppler)	Vmax PGmax
	• AV VTI (Doppler)	VTI

Calculation list	Measurement name (imaging mode)	Results
		Vmax PGmax Vmean PGmean AVA
	LVOT • VMAX (Doppler) • VTI (Doppler) • LVOT D (2D)	VTI Vmax PGmax Vmean PGmean LVOT D
	AI • PHT (Doppler)	AI PHT AI slope

Calculation list	Measurement name (imaging mode)	Results
TV/TR	TR VMax (Doppler)	Vmax PGmax
	RA pressure[c]	RVSP
	E (Doppler) A (Doppler)	E E PG A

Calculation list	Measurement name (imaging mode)	Results
		A PG E:A
	PHT (Doppler)	PHT TVA Decel
	TV VTI (Doppler)	VTI Vmax PGmax Vmean PGmean

Calculation list	Measurement name (imaging mode)	Results
PV	VMAX (Doppler)	Vmax PGmax
	PV VTI (Doppler) AT (Doppler)	VTI Vmax PGmax Vmean PGmean AT

Calculation list	Measurement name (imaging mode)	Results
CO	LVOT Diam (2D) HR (Doppler) AV VTI (Doppler)	CO CI HR VTI

Calculation list	Measurement name (imaging mode)	Results
P Vein	A (Doppler) Adur (Doppler) S (Doppler) D (Doppler)	VMax time VMax S/D ratio VMax

Calculation list	Measurement name (imaging mode)	Results
PISA	Radius (Color) MR VTI (Doppler) Ann Diam (2D) MV VTI (Doppler)	PISA Area VAlias ERO MV Regurgitant Volume Regurgitant Fraction VMax

Calculation list	Measurement name (imaging mode)	Results
		PGmax

Calculation list	Measurement name (imaging mode)	Results
Qp/Qs	LVOT Diam (2D) RVOT D (2D) LVOT VTI (Doppler) RVOT VTI (Doppler)	LVOT D RVOT D VTI VMax PGmax Vmean PGmean SV Qp/Qs

Calculation list	Measurement name (imaging mode)	Results
TDI	Sep e' (Doppler) Sep a' (Doppler) Lat e' (Doppler) Lat a' (Doppler) Inf e' (Doppler) Inf a' (Doppler)	E(MV)/e' ratio

Calculation list	Measurement name (imaging mode)	Results
	Ant e' (Doppler) Ant a' (Doppler)	

a. You can enter the HR measurement on the patient form, by Doppler measurement (See "To measure Heart Rate (HR)" on page 245), or by M Mode measurement (See "To measure heart rate (M Mode)" on page 206).

b. Performed at 300 cm/s on the negative side of the baseline.

c. Specified on the cardiac patient report.

To calculate Proximal Isovelocity Surface Area (PISA)

The PISA calculation requires a measurement in 2D, a measurement in Color, and two measurements in Doppler spectral trace. After all measurements are saved, the result appears in the patient report.

1 Measure from Ann D:

a On a frozen 2D image, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

b On the **PISA** calculation list, tap **Ann D**.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

c Position the calipers by dragging.

d Save the calculation: Tap **Save** under the measurement name.

2 Measure from Radius:

a On a frozen Color image, tap **Calcs**.

b On the **PISA** calculation list, tap **Radius**.

c Position the calipers by dragging.

d Save the calculation: Tap **Save** under the measurement name.

3 On a frozen Doppler spectral trace, tap **Calcs**.

4 Do the following to measure from MR VTI and again to measure from MV VTI:

a On the **PISA** calculation list, tap **MR VTI** or **MV VTI**.

b Drag the caliper to the start of the waveform, and tap **Set** to start the trace.

c Using your finger, trace the waveform.

To make a correction, trace backward on the dotted line.

d Tap **Close** to complete the trace.

e Save the calculation: Tap **Save** under the measurement name.

To measure LVd and LVs

1 On a frozen 2D image or M Mode trace, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 On the **LV** calculation list, tap the name of the first measurement you want to take.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

3 Position the calipers by dragging.

4 If you want to take additional measurements, tap either of the following and then position the calipers:

- **Next** to advance to the next item in the calculation list.
- The measurement name in the calculation list.

If you need to redo a measurement, select the measurement name and tap **Delete**.

5 Save the calculation: Tap **Save Set** under the measurement name. The system saves all on-screen measurements for the calculation.

To measure Ao, LA, AAo, or LVOT Diam

1 On a frozen 2D image or M Mode trace, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 On the **Ao/LA** calculation list, tap the measurement name.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

3 Position the calipers by dragging.

4 Save the calculation: Tap **Save** under the measurement name.

To calculate LV Volume (Simpson's Rule)

1 On a frozen 2D image, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 Do the following for each measurement:

a On the **LV Vol** calculation list, tap the desired view and phase.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

b Position the caliper at the mitral annulus, and tap **Set** to start the trace.

c Using your finger, trace the left ventricular (LV) cavity.

To make a correction, trace backward on the dotted line.

d Complete the trace, and tap **Close**.

e Adjust the axis as needed.

f Save the calculation: Tap **Save** under the measurement name.

To calculate MV or AV area

1 On a frozen 2D image, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 On the **Area** calculation list, tap **MVA** or **AAV**.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

3 Drag the caliper to where you want to begin the trace, and tap **Set**.

4 Using your finger, trace the desired area.

To make a correction, trace backward on the dotted line.

5 Do one of the following:

- To save the measurement and close the trace, tap **Save**.
- To close the trace, tap **Close**.

To calculate LV Mass

1 On a frozen 2D image, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 Do the following for Epi and then for Endo:

a On the **LV Mass** calculation list, tap the measurement name.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

b Drag the caliper to where you want to begin the trace, and tap **Set**.

c Using your finger, trace the desired area.

To make a correction, trace backward on the dotted line.

3 Tap **Save** under the measurement name to save the calculation and close the trace.

4 On the **LV Mass** calculation list, tap **Apical**.

5 Positioning the calipers, measure the ventricular length.

6 Save the calculation: Tap **Save** under the measurement name.

To measure peak velocity

For each cardiac measurement, the system saves up to five individual measurements and calculates their average. If you take more than five measurements, the most recent measurement replaces the oldest measurement. If you delete a saved measurement from the patient report, the next measurement taken replaces the deleted one in the patient report.

1 On a frozen Doppler spectral trace, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 On the **MV/MR**, **TV/TR**, **TDI**, or **P Vein** calculation list, do the following for each measurement you want to take:

To select a calculation list, tap at the top of the current list, and then tap the desired list.

a Tap the measurement name.

b Position the calipers.

c Save the calculation: tap **Save** or **Save Set**.

3 If you want to take additional measurements, tap either of the following and then position the calipers:

- **Next** to advance to the next item in the calculation list.
- The measurement name in the calculation list.

To calculate Velocity Time Integral (VTI)

This calculation computes other results in addition to VTI. See "Measurements required to complete Cardiac calculations" on page 225.

1 On a frozen Doppler spectral trace, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 On the **MV/MR**, **AV/LVOT/AI**, **TV/TR**, or **PV** calculation list, tap **VTI**.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

3 Drag the caliper to the start of the waveform, and tap **Set**.

4 Using your finger, trace the waveform.

To make a correction, trace backward on the dotted line.

5 Complete the trace, and tap **Close**.

6 Save the calculation: Tap **Save** under the measurement name.

To calculate Right Ventricular Systolic Pressure (RVSP)

1 On a frozen Doppler spectral trace, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 On the **TV/TR** calculation list, tap **TR VMax**.

3 Position the caliper by dragging.

4 Save the calculation: Tap **Save** under the measurement name.

To adjust the RA pressure, see "(Cardiac) To adjust the RA pressure" on page 287.

Changing the RA pressure from the default 5 affects the RVSP calculation in the patient report.

To calculate Pressure Half Time (PHT) in MV, AI, or TV

1 On a frozen Doppler spectral trace, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 On the **MV/MR**, **AV/LVOT/AI**, or **TV/TR** calculation list, tap **PHT**.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

3 Drag the first caliper to the peak.

A second caliper appears.

4 Position the second caliper:

a In MV, drag the caliper along the E-F slope.

b In AV, drag the caliper to the end diastole.

5 Save the calculation: Tap **Save** under the measurement name.

To calculate Isovolumic Relaxation Time (IVRT)

1 On a frozen Doppler spectral trace, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 On the **MV/MR** calculation list, tap **IVRT**.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

A vertical caliper appears.

3 Drag the caliper to the aortic valve closure.

A second vertical caliper appears.

4 Drag the second caliper to onset of mitral inflow.

5 Save the calculation: Tap **Save** under the measurement name.

To calculate Delta Pressure: Delta Time (dP:dT)

To perform the dP:dT measurements, the CW Doppler scale must include velocities of 300 cm/s or greater on the negative side of the baseline. (See "Controls in Doppler" on page 157.)

1 On a frozen CW Doppler spectral trace, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 On the **MV/MR** calculation list, tap **dP:dT**.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

A horizontal dotted line with an active caliper appears at 100 cm/s.

3 Drag the first caliper along the waveform at 100 cm/s.

A second horizontal dotted line with an active caliper appears at 300 cm/s.

4 Drag the second caliper along the waveform at 300 cm/s.

5 Save the calculation: Tap **Save** under the measurement name.

To calculate Aortic Valve Area (AVA)

The AVA calculation requires a measurement in 2D and two measurements in Doppler. After the measurements are saved, the result appears in the patient report.

1 In 2D, measure from LVOT:

a On a frozen 2D image, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

b On the **AV/LVOT/AI** calculation list, tap **LVOT D**.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

c Position the calipers by dragging.

d Save the calculation: Tap **Save** under the measurement name.

2 In Doppler, measure LVOT Vmax or VTI, and then measure AV Vmax or VTI.

- For VMAX, see "To measure peak velocity" on page 238. From the **AV/LVOT/AI** calculation list, select **VMAX** under **AV**, and place calipers at the sample site.
- For VTI, see "To calculate Velocity Time Integral (VTI)" on page 239. From the **AV/LVOT/AI** calculation list, select **VTI** under **AV**, and place calipers at the sample site.

To calculate Qp/Qs

The Qp/Qs calculation requires two measurements in 2D and two measurements in Doppler. After the measurements are saved, the result appears in the patient report.

1 On a frozen 2D image, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 Do the following to measure from LVOT D and again to measure from RVOT D:

a From the **Qp/Qs** calculations list, select **LVOT D** or **RVOT D**.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

b Position the calipers by dragging.

c Save the calculation: Tap **Save** under the measurement name.

3 On a frozen Doppler spectral trace, tap **Calcs**.

4 Do the following to measure from LVOT VTI and again to measure from RVOT VTI:

a From the **Qp/Qs** calculations list, select **LVOT VTI** or **RVOT VTI**.

b Tap **Set** to start the trace.

c Using your finger, trace the waveform.

To make a correction, trace backward on the dotted line.

d Tap **Close** to complete the trace.

e Save the calculation:Tap **Save** under the measurement name.

For information on the automatic trace tool, see "To trace automatically (Doppler)" on page 208.

To calculate Stroke Volume (SV) or Stroke Index (SI)

The SV and SI calculations require a measurement in 2D and a measurement in Doppler. SI also requires Body Surface Area (BSA). After the measurements are saved, the result appears in the patient report.

1 (SI Only) Fill in the **Height** and **Weight** fields on the patient form. The BSA is calculated automatically. (See "Entering patient information" on page 76.)

2 Measure LVOT:

a On a frozen 2D image, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

b From the **AV/LVOT/AI** calculation list, tap **LVOT D**.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

c Position the calipers at LVOT area by dragging.

d Save the calculation: Tap **Save** under the measurement name.

3 Measure from aorta (Doppler). See "To calculate Velocity Time Integral (VTI)" on page 239. From the **AV/LVOT/AI** calculation list, select **VTI** under **AV**.

For information on the automatic trace tool, see "To trace automatically (Doppler)" on page 208.

To measure Heart Rate (HR)

Heart Rate is available in all cardiac packages. The Heart Rate is not calculated using the ECG trace.

1 On a frozen Doppler spectral trace, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 On the CO calculations list, tap **HR**.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

A vertical caliper appears.

3 Drag the first vertical caliper to the peak of the heartbeat.

A second vertical caliper appears. The active caliper is highlighted green.

4 Drag the second vertical caliper to the peak of the next heartbeat.

5 Save the calculation: Tap **Save** under the measurement name.

To calculate Cardiac Output (CO) or Cardiac Index (CI)

The CO and CI calculations require Stroke Volume and Heart Rate calculations. CI also requires Body Surface Area (BSA). After the measurements are saved, the result appears in the patient report.

1 (CI Only) Fill in the **Height** and **Weight** fields on the patient form. The BSA is calculated automatically. (See "Entering patient information" on page 76.)

2 Calculate SV. See "To calculate Stroke Volume (SV) or Stroke Index (SI)" on page 244.

3 Calculate HR. See "To measure Heart Rate (HR)" on page 245.

To measure a Tissue Doppler Imaging (TDI) waveform

1 Ensure that TDI is on. (See "Controls in Doppler" on page 157.)

2 On a frozen Doppler spectral trace, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

3 Do the following for each measurement you want to take:

a On the TDI calculation list, tap the measurement name.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

b Position the calipers by dragging.

c Save the calculation: Tap **Save** under the measurement name.

Gynecological calculations

Warning: To avoid incorrect calculations, verify that the patient information, date, and time settings are accurate.

Warning: To avoid misdiagnosis or harming the patient outcome, start a new patient form before starting a new patient exam and performing calculations. Starting a new patient form clears the previous patient's data. The previous patient's data will be combined with the current patient if the form is not first cleared. See "Entering patient information" on page 76.

The Gynecological calculations include measurements for uterus, ovaries, and follicles.

In the Gynecological exam, you can also calculate volume (see "Volume calculation" on page 215).

Measuring uterus

You can measure uterus length (L), width (W), height (H), and endometrial thickness. If you measure length, width, and height, the system also calculates the volume.

To measure uterus

1 On the frozen 2D image, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 On the Uterus list, do the following for each measurement you want to take:

To select a calculation list, tap at the top of the current list, and then tap the desired list.

a In the Uterus list, tap the measurement name.

b Position the calipers by dragging.

c Save the measurement.

Measuring ovaries

You can take up to three distance (D) measurements on each ovary. The system also calculates the volume based on the three measurements.

To measure ovaries

1 On the frozen 2D image, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 On the **Ovary** calculation list, do the following for each measurement you want to take:

To select a calculation list, tap at the top of the current list, and then tap the desired list.

a Tap the measurement name under **Right Ovary** or **Left Ovary**.

b Position the calipers by dragging.

c Save the measurement.

Measuring follicles

On each side, you can save up to three distance (D) measurements per follicle, for up to ten follicles. The system can display up to eight measurements at once.

If you measure a follicle twice, the average appears in the report. If you measure a follicle three times, the average and a volume calculation appear in the report. Volumes are derived based on one distance, two distance, and three distance measurements.

To measure follicles

1 On the frozen 2D image, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 On the **Follicle Right** (if measuring the right side) or **Follicle Left** (if measuring the left side) calculation list, do the following for each measurement you want to take:

To select a calculation list, tap at the top of the current list, and then tap the desired list.

a Tap the measurement name.

The measurement names appear under **1**, **2**, **3**, and so on, to pertain to the 10 follicle calculations available.

b Position the calipers by dragging.

c Under the measurement name, tap **Save Set** or to measure another follicle, tap **Next**.

A number appears before the measurement name and on the image. For the first measurement, 1 is used. For the second measurement, 2 is used, and so on.

Obstetrics calculations

Warning: **Make sure that you have selected the Obstetrics exam type and the OB author for the Obstetrical calculation table you intend to use. See "Obstetrics calculations settings " on page 41.**

Warning: **To avoid incorrect obstetrics calculations, verify with a local clock and calendar that the system's date and time settings are correct before each use of the system. The system does not automatically adjust for daylight savings time changes.**

Warning: **Prior to use, verify that Obstetrical custom table data entries are correct. The system does not confirm the accuracy of the custom table data entered by the user.**

Warning: **To avoid incorrect calculations, verify that the patient information, date, and time settings are accurate.**

Warning: **To avoid misdiagnosis or harming the patient outcome, start a new patient form before starting a new patient exam and performing calculations. Starting a new patient form clears the previous patient's data. The previous patient's data will be combined with the current patient if the form is not first cleared. See "Entering patient information" on page 76.**

In X-Porte, you can calculate gestational age, fetal heart rate, middle cerebral artery, and umbilical artery blood flow velocities.

You can select authors for Obstetrical calculations. See "Obstetrics calculations settings " on page 41 and "Measurement references " on page 264.

EFW is calculated only after appropriate measurements are completed. If any one of these parameters results in an EDD greater than what the Obstetrical calculation tables provide, the EFW is not displayed.

Note: If you change the calculation author during the exam, the common measurements are retained.

Results from system-defined obstetrical measurements and table authors

Calculation result	Gestational OB measurements	Available authors
Gestational Age[a]	YS	—
	GS	Hansmann, Nyberg, Tokyo U.
	CRL	Hadlock, Hansmann, Osaka, Tokyo U.
	BPD	Chitty, Hadlock, Hansmann, Osaka, Tokyo U.
	OFD	Hansmann
	HC	Chitty, Hadlock, Hansmann
	TTD	Hansmann, Tokyo U.[b]
	APTD	Tokyo U.[b]
	AC	Hadlock, Hansmann, Tokyo U.
	FTA	Osaka
	FL	Chitty, Hadlock, Hansmann, Osaka, Tokyo U.
	HL	Jeanty
	TL	Jeanty
	Cereb D	—
	CM	—
	Lat Vent	—
	Cx Len	—

Calculation result	Gestational OB measurements	Available authors
Estimated Fetal Weight (EFW)[c]	HC, AC, FL	Hadlock 1
	BPD, AC, FL	Hadlock 2
	AC, FL	Hadlock 3
	BPD, TTD	Hansmann
	BPD, FTA, FL	Osaka U.
	BPD, AC	Shepard
	BPD, TTD, APTD, FL	Tokyo U.
Ratios	HC/AC	Campbell
	FL/AC	Hadlock
	FL/BPD	Hohler
	FL/HC	Hadlock
Amniotic Fluid Index	Q^1, Q^2, Q^3, Q^4	Jeng
Growth Analysis Tables[d]	BPD	Chitty, Hadlock, Jeanty
	HC	Chitty, Hadlock, Jeanty
	AC	Chitty, Hadlock, Jeanty
	FL	Chitty, Hadlock, Jeanty
	EFW	Brenner, Hadlock, Jeanty
	HC/AC	Campbell

a. The Gestational Age is automatically calculated and displayed next to the Obstetrical measurement you selected. The average of the results is the AUA. Only measurements of the same type are averaged.

b. For Tokyo U., APTD and TTD are used only to calculate EFW. No age or growth tables are associated with these measurements.

c. The Estimated Fetal Weight (EFW) calculation uses an equation that consists of one or more fetal biometry measurements. The author for the Obstetrical tables, which you choose on a system setup page, determines the measurements you must perform to obtain an EFW calculation.

Individual selections for Hadlock's EFW equations 1, 2, and 3 are not determined by the user. The selected equation is determined by the measurements that have been saved to the patient report with priority given to the order listed above.

d. The Growth Analysis tables are used by the Report Graphs feature. Three growth curves are drawn using the table data for the selected growth parameter and published author. Growth tables are available only with a user-entered LMP or EDD.

To measure gestational growth (2D)

For each 2D Obstetrical measurement (except AFI), the system saves up to three individual measurements and their average. If you take more than three measurements, the earliest measurement is deleted.

1 Make sure that the Obstetrics exam type is selected.

2 On the patient form, select **LMP**or **EDD**. Select **Twins** if twins.

3 On a frozen 2D image, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

4 Do the following for each measurement you want to take:

a Select the calculation list that contains the measurement.

To select a calculation list, tap at the top of the current list, and then tap the desired list. For twins, there are two sets of calculation lists: Each list in one set is labeled **Twin A**, and each list in the other set is labeled **Twin B**.

b Tap the measurement name.

The caliper tool may change depending on the measurement selected, but the position remains constant.

c Position the calipers by dragging.

d Tap **Save** under the measurement name.

To measure heart rate (M Mode or Doppler)

1 Make sure that the Obstetrics exam type is selected.

2 On a frozen M Mode or Doppler trace, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

3 Tap **HR** on the following calculation list:

- For M Mode, the **HR** calculation list (or, if twins, the **Twin A HR** list or **Twin B HR** list).
- For Doppler, the **Doppler Measurements** list (or, if twins, the **Twin A Doppler Measurements** list or **Twin B Doppler Measurements** list).

A vertical caliper appears.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

4 Drag the vertical caliper to the peak of the heartbeat.

A second vertical caliper appears.

5 Drag the second vertical caliper to the peak of the next heartbeat.

6 Tap **Save** under the measurement name.

To calculate the S/D ratio, RI or PI of the Middle Cerebral Artery (MCA) or Umbilical Artery (UmbA) (Doppler)

1 Make sure that the Obstetrics exam type is selected.

2 On the patient form, select **LMP**or **EDD**. Select **Twins** if twins.

3 On a frozen Doppler spectral trace, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

4 Do the following for each measurement you need to take:

a On the **Doppler Measurements** calculations list, tap the measurement name under **MCA** or **UmbA**.

b Position the calipers:

- For **S/D, RI**, drag the first caliper to the peak systolic waveform. Tap **Next**, and then drag the second caliper to the end diastole on the waveform.
- For **S/D, RI, PI**, drag the caliper to the beginning of the desired waveform, and tap **Set**. Trace the desired area, and then tap **Close**.

If calipers are positioned imprecisely, the calculation result is inaccurate.

5 Save the calculation.

Only one calculation (**S/D, RI** or **S/D, RI, PI**) can be saved.

Required measurements for MCA or UmbA

Calculation list	Section heading	Measurement name	Results
Doppler Measurements	MCA	Systolic	SD

Calculation list	Section heading	Measurement name	Results
		Diastolic S/D, RI	RI
		Systolic Diastolic S/D, RI, PI*	SD RI PI
	Umb A	Systolic Diastolic S/D, RI	RI SD
		Systolic Diastolic S/D, RI, PI*	SD RI PI

**Calculation requires a trace measurement.*

Related topics

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Small Parts calculations

Warning: To avoid incorrect calculations, verify that the patient information, date, and time settings are accurate.

Warning: To avoid misdiagnosis or harming the patient outcome, start a new patient form before starting a new patient exam and performing calculations. Starting a new patient form clears the previous patient's data. The previous patient's data will be combined with the current patient if the form is not first cleared. See "Entering patient information" on page 76.

The Small Parts calculations include hip angle and hip ratio.

In the Small Parts exam, you can also calculate volume and percent reduction. See "Volume calculation" on page 215 and "Percent reduction calculations" on page 220.

To calculate hip angle

1 On a frozen 2D image, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 Do the following under **Right Hip** and again under **Left Hip**:

To select a calculation list, tap at the top of the current list, and then tap the desired list.

a Under **Hip Angle**, tap **Baseline**.

A baseline with calipers appears.

b Position the baseline by dragging the calipers.

c Tap **Line A** (alpha line).

Calipers for Line A appear.

d Position Line A by dragging calipers, and tap **Save**.

e Tap **Line B** (beta line).

Calipers for Line B appear.

f Position Line B by dragging calipers, and tap **Save**.

To calculate hip ratio

1 On a frozen 2D image, tap **Calcs**.

If this control is hidden, tapping **More Controls** displays it.

2 Do the following under **Right Hip** and again under **Left Hip**:

To select a calculation list, tap at the top of the current list, and then tap the desired list.

a Under **d:D Ratio**, tap **Fem Hd** (femoral head).

An ellipse with calipers appears.

b Position and resize the ellipse by dragging its calipers.

c Tap **Baseline**.

The baseline appears automatically.

d Position the baseline by dragging its caliper.

Acute Care calculations

Warning: To avoid incorrect calculations, verify that the patient information, date, and time settings are accurate.

Warning: To avoid misdiagnosis or harming the patient outcome, start a new patient form before starting a new patient exam and performing calculations. Starting a new patient form clears the previous patient's data. The previous patient's data will be combined with the current patient if the form is not first cleared. See "Entering patient information" on page 76.

The Acute Care calculations are part of the licensed Acute Care feature. Results from Acute Care calculations appear in the Acute Care worksheets. (See "Worksheets and reports" on page 286.)

You can perform any of the following calculations, in any exam type. Distance measurements are in mm.

Calculation list	Measurement name (imaging mode)
Abdominal Aorta	Maximal aortic diameter (2D)
Obstetrical Pelvic	Yolk Sac (2D) Gestational Sac (2D) Myometrial Thickness (2D) CRL (2D)* BPD (2D)* Fetal HR (M Mode) Adnexa • Right Ovarian Cyst (2D) • Left Ovarian Cyst (2D)

Calculation list	Measurement name (imaging mode)
	**Calculates a gestational age. See "Obstetrics calculations " on page 250for related information. Uses the selected gestational age table. See "Calculations settings" on page 40.*
Non-Obstetrical Pelvic	Endometrial Stripe (2D) Uterine Fibroid (2D) Adnexa Right Ovarian Size (2D)* • Length • Width • Height • Right Ovarian Cyst • Resistive index (Doppler) Adnexa Left Ovarian Size (2D)* • Length • Width • Height • Left Ovarian Cyst • Resistive index (Doppler) ** Volume is calculated in ML after Length, Width, and Height measurements are taken.*
Biliary	Gallstone (2D)

Calculation list	Measurement name (imaging mode)
	Gallbladder Wall (2D) CBD (2D) Transverse Gallbladder (2D) Longitudinal Gallbladder (2D)
Renal/ Urinary Tract	Right Kidney (2D) • Kidney Stone • Renal Cyst Left Kidney (2D) • Kidney Stone • Renal Cyst Bladder (2D)* • Width • Height • Length ** Bladder volume is calculated in ML after Width, Height, and Depth measurements are taken.*
Cardiac	TR VMAx (Doppler) Aortic Root (2D) Thoracic Aorta Diameter (2D) IVC • Maximum Diameter (2D)

Calculation list	Measurement name (imaging mode)
	• Minimum Diameter (2D)
Soft Tissue/ MSK	Tissue Thickness (2D) Subcutaneous Collection Diameter (2D)
Ocular	Eye • Right ONSD (2D) • Left ONSD (2D)

To perform an Acute Care calculation

1 On a frozen image, tap **Acute Care**.

If this control is hidden, tapping **More Controls** displays it.

2 Do the following for each measurement you want to take:

a Select the calculation list that contains the measurement.

To select a calculation list, tap at the top of the current list, and then tap the desired list.

b Tap the measurement name.

c Position the calipers by dragging.

If a Doppler measurement, drag the caliper to a peak systolic waveform, and tap **Next**. A second caliper appears. Drag the second caliper to the end diastole on the waveform.

d Save the measurement: Tap **Save** or **Save Set** under the measurement name.

Related topics

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Measurement references

The following are the publications and terminology used for each calculation result.

Terminology and measurements comply with American Institute of Ultrasound in Medicine (AIUM) published standards.

Cardiac references

Acceleration (ACC) in cm/s^2

Zwiebel, W.J. *Introduction to Vascular Ultrasonography*. 4th ed., W.B. Saunders Company, (2000), 52.

ACC = abs (delta velocity/delta time)

Acceleration Time (AT) in msec

Oh, J.K., J.B. Seward, A.J. Tajik. *The Echo Manual*. 2nd ed., Lippincott, Williams, and Wilkins, (1999), 219.

Aortic Valve Area (AVA) by Continuity Equation in cm^2

Reynolds, Terry. *The Echocardiographer's Pocket Reference*. 2nd ed., School of Cardiac Ultrasound, Arizona Heart Institute, (2000), 393, 442.

$A_2 = A_1 * V_1/V_2$

where:

$A_2 = A_o$ valve area
A_1 = LVOT area; V_1 = LVOT

velocity; $V_2 = A_o$ valve velocity
LVOT = Left Ventricular Outflow Tract

$AVA\ (PV_{LVOT}/PV_{AO}) * CSA_{LVOT}$

$AVA\ (VTI_{LVOT}/VTI_{AO}) * CSA_{LVOT}$

Body Surface Area (BSA) in m^2

Grossman, W. *Cardiac Catheterization and Angiography*. Philadelphia: Lea and Febiger, (1980), 90.

$BSA = 0.007184 * Weight^{0.425} * Height^{0.725}$

Weight = kilograms

Height = centimeters

Cardiac Index (CI) in l/min/m^2

Oh, J.K., J.B. Seward, A.J. Tajik. *The Echo Manual*. 2nd Edition, Boston: Little, Brown and Company, (1999), 59.

CI = CO/BSA

where:

CO = Cardiac Output
BSA = Body Surface Area

Cardiac Output (CO) in l/min

Oh, J.K., J.B. Seward, A.J. Tajik *The Echo Manual*. 2nd ed., Lippincott, Williams, and Wilkins, (1999), 59.

CO = (SV * HR)/1000

where:

CO = Cardiac Output
SV = Stroke Volume
HR = Heart Rate

Cross Sectional Area (CSA) in cm^2

Reynolds, Terry. *The Echocardiographer's Pocket Reference*. 2nd ed., School of Cardiac Ultrasound, Arizona Heart Institute, (2000), 383.

$CSA = 0.785 * D^2$

where: D = diameter of the anatomy of interest

Deceleration Time in msec

Reynolds, Terry. *The Echocardiographer's Pocket Reference*. 2nd ed., School of Cardiac Ultrasound, Arizona Heart Institute, (2000), 453.

|time a - time b|

Delta Pressure: Delta Time (dP:dT) in mmHg/s

Otto, C.M. *Textbook of Clinical Echocardiography*. 2nd ed., W.B. Saunders Company, (2000), 117, 118.

32 mmHg/time interval in seconds

E:A Ratio in cm/sec

E:A = velocity E/velocity A

E/Ea Ratio

Reynolds, Terry. *The Echocardiographer's Pocket Reference*. 2nd ed., School of Cardiac Ultrasound, Arizona Heart Institute, (2000), 225.

E Velocity/Ea velocity

where:

E velocity = Mitral Valve E velocity
Ea = annular E velocity, also known as: E prime

Effective Regurgitant Orifice (ERO) in mm^2

Reynolds, Terry. *The Echocardiographer's Pocket Reference*. 2nd ed., School of Cardiac Ultrasound, Arizona Heart Institute, (2000), 455.

ERO = 6.28 (r^2) * Va/MR Vel

where:

r = radius
Va = aliasing velocity

Ejection Fraction (EF), percent

Oh, J.K., J.B. Seward, A.J. Tajik. *The Echo Manual*. 2nd ed., Lippincott, Williams, and Wilkins, (1999), 40.

EF = ((LVEDV – LVESV)/LVEDV) * 100%

where:

EF = Ejection Fraction
LVEDV = Left Ventricular End Diastolic Volume
LVESV = Left Ventricular End Systolic Volume

Elapsed Time (ET) in msec

ET = time between velocity cursors in milliseconds

Heart Rate (HR) in bpm

HR = 3 digit value input by user or measured on M Mode and Doppler image in one heart cycle

Interventricular Septum (IVS) Fractional Thickening, percent

Laurenceau, J. L., M.C. Malergue. *The Essentials of Echocardiography*. Le Hague: Martinus Nijhoff, (1981), 71.

IVSFT = ((IVSS – IVSD)/IVSD) * 100%

where:

IVSS = Interventricular Septal Thickness at Systole
IVSD = Interventricular Septal Thickness at Diastole

Isovolumic Relaxation Time (IVRT) in msec

Reynolds, Terry. *The Echocardiographer's Pocket Reference*. School of Cardiac Ultrasound, Arizona Heart Institute, (1993), 146.

|time a - time b|

Left Atrium/Aorta (LA/Ao)

Feigenbaum, H. *Echocardiography*. Philadelphia: Lea and Febiger, (1994), 206, Figure 4-49.

Left Ventricular End Volumes (Teichholz) in ml

Teichholz, L.E., T. Kreulen, M.V. Herman, et. al. “Problems in echocardiographic volume determinations: echocardiographic-angiographic correlations in the presence or absence of asynergy.” *American Journal of Cardiology*, (1976), 37:7.

$LVESV = (7.0 * LVDS^3)/(2.4 + LVDS)$

where:

LVESV = Left Ventricular End Systolic Volume
LVDS = Left Ventricular Dimension at Systole

$LVEDV = (7.0 * LVDD^3)/(2.4 + LVDD)$

where:

LVEDV = Left Ventricular End Diastolic Volume
LVDD = Left Ventricular Dimension at Diastole

Left Ventricular Mass in gm for 2D

Schiller, N.B., P.M. Shah, M. Crawford, et.al. “Recommendations for Quantification of the Left Ventricle by Two-Dimensional Echocardiography.” *Journal of American Society of Echocardiography*. September-October 1998, 2:364.

$LV\ Mass = 1.05 * \{[(5/6) * A1 * (a + d + t)] - [(5/6) * A2 * (a + d)]\}$

where:

A1 = short axis area, diastole (Epi)
A2 = short axis area, diastole (Endo)
a = long or semi major axis
d = truncated semi major axis from the widest short axis diameter to mitral annulus plane.
t = myocardial thickness

Left Ventricular Mass in gm for M Mode

Oh, J.K., J.B. Seward, A.J. Tajik. *The Echo Manual*. 2nd Edition, Boston: Little, Brown and Company, (1999), 39.

$LV\ Mass = 1.04\ [(LVID + PWT + IVST)^3 - LVID^3] * 0.8 + 0.6$

where:

LVID = Internal Dimension
PWT = Posterior Wall Thickness
IVST = Interventricular Septal Thickness
1.04 = Specific gravity of the myocardium
0.8 = Correction factor

Left Ventricular Volume: Biplane Method in ml

Schiller, N.B., P.M. Shah, M. Crawford, et.al. “Recommendations for Quantitation of the Left Ventricle by Two-Dimensional Echocardiography.” *Journal of American Society of Echocardiography*. September-October 1989, 2:362.

$$V = \left(\frac{\pi}{4}\right) \sum_{i=1}^{n} a_i b_i \left(\frac{L}{n}\right)$$

where:

V = Volume in ml
a = Diameter
b = Diameter
n = Number of segments (n=20)
L = Length
i = Segment

Left Ventricular Volume: Single Plane Method in ml

Schiller, N.B., P.M. Shah, M. Crawford, et.al. “Recommendations for Quantitation of the Left Ventricle by Two-Dimensional Echocardiography.” *Journal of American Society of Echocardiography*. September-October 1989, 2:362.

$$V = \left(\frac{\pi}{4}\right) \sum_{i=1}^{n} a_i^2 \left(\frac{L}{n}\right)$$

where:

V = Volume
a = Diameter
n = Number of segments (n=20)
L = Length
i = Segment

Left Ventricular Dimension (LVD) Fractional Shortening, percent

Oh, J.K., J.B. Seward, A.J. Tajik. *The Echo Manual. Boston*: Little, Brown and Company, (1994), 43-44.

LVDFS = ((LVDD – LVDS)/LVDD) * 100%

where:

LVDD = Left Ventricle Dimension at Diastole
LVDS = Left Ventricle Dimension at Systole

Left Ventricular Posterior Wall Fractional Thickening (LVPWFT), percent

Laurenceau, J. L., M.C. Malergue. *The Essentials of Echocardiography*. Le Hague: Martinus Nijhoff, (1981), 71.

LVPWFT = ((LVPWS – LVPWD)/LVPWD) * 100%

where:

LVPWS = Left Ventricular Posterior Wall Thickness at Systole
LVPWD = Left Ventricular Posterior Wall Thickness at Diastole

Mean Velocity (Vmean) in cm/s

Vmean = mean velocity

Mitral Valve Area (MVA) in cm^2

Reynolds, Terry. *The Echocardiographer's Pocket Reference*. 2nd ed., School of Cardiac Ultrasound, Arizona Heart Institute, (2000), 391, 452.

MVA = 220/PHT

where: PHT = pressure half time

Note: 220 is an empirical derived constant and may not accurately predict mitral valve area in mitral prosthetic heart valves. The mitral valve area continuity equation may be utilized in mitral prosthetic heart valves to predict effective orifice area.

MV Flow Rate in cc/sec

Reynolds, Terry. *The Echocardiographer's Pocket Reference*. 2nd ed., School of Cardiac Ultrasound, Arizona Heart Institute, (2000), 396.

Flow = 6.28 (r^2) * Va

where:

r = radius
Va = aliasing Velocity

Pressure Gradient (PGr) in mmHG

Oh, J.K., J.B. Seward, A.J. Tajik. *The Echo Manua*l. 2nd ed., Lippincott, Williams, and Wilkins, (1999), 64.

PGr = 4 * $(Velocity)^2$

Peak E Pressure Gradient (E PG)

E PG = 4 * PE^2

Peak A Pressure Gradient (A PG)

A PG = 4 * PA^2

Peak Pressure Gradient (PGmax)

PGmax = 4 * PV^2

Mean Pressure Gradient (PGmean)

PGmean = Average of pressure gradients/Duration of flow

Pressure Half Time (PHT) in msec

Reynolds, Terry. *The Echocardiographer's Pocket Reference*. 2nd ed., School of Cardiac Ultrasound, Arizona Heart Institute, (2000), 391.

PHT = DT * 0.29

where: DT = deceleration time

Proximal Isovelocity Surface Area (PISA) in cm^2

Oh, J.K., J.B. Seward, A.J. Tajik. *The Echo Manual*. 2nd ed., Boston: Little, Brown and Company, (1999), 125.

$PISA = 2 \pi r^2$

where:

$2\pi = 6.28$
r = aliasing radius

Qp/Qs

Reynolds, Terry. *The Echocardiographer's Pocket Reference*. 2nd ed., School of Cardiac Ultrasound, Arizona Heart Institute, (2000), 400.

Qp/Qs = SV Qp site/SV Qs site

SV sites will vary depending upon the location of the shunt.

Regurgitant Fraction (RF) in percent

Oh, J.K., J.B. Seward, A.J. Tajik. *The Echo Manual*. Boston: Little, Brown and Company, (1999), 125.

RF = RV/ MV SV

where:

RV = Regurgitant Volume
MV SV = Mitral Stroke Volume

Regurgitant Volume (RV) in cc

Reynolds, Terry. *The Echocardiographer's Pocket Reference*. School of Cardiac Ultrasound, Arizona Heart Institute, (2000), 396, 455.

RV = ERO * MR VTI

Right Ventricular Systolic Pressure (RVSP) in mmHg

Reynolds, Terry. *The Echocardiographer's Pocket Reference*. School of Cardiac Ultrasound, Arizona Heart Institute, (1993), 152.

$RVSP = 4 * (Vmax\ TR)^2 + RAP$

where: RAP = Right Atrial Pressure

S/D

Reynolds, Terry. *The Echocardiographer's Pocket Reference*. 2nd ed., School of Cardiac Ultrasound, Arizona Heart Institute, (2000), 217.

S velocity/D velocity

where:

S velocity = Pulmonary vein S wave
D velocity= Pulmonary vein D wave

Stroke Index (SI) in cc/m^2

Mosby's Medical, Nursing, & Allied Health Dictionary, 4th ed., (1994), 1492.

SI = SV/BSA

where:

SV = Stroke Volume
BSA = Body Surface Area

Stroke Volume (SV) Doppler in ml

Oh, J.K., J.B. Seward, A.J. Tajik. *The Echo Manual*. 2nd ed., Lippincott, Williams, and Wilkins, (1999), 40, 59, 62.

SV = (CSA * VTI)

where:

CSA = Cross Sectional Area of the orifice (LVOT area)
VTI = Velocity Time Integral of the aortic valve

Stroke Volume (SV) 2D and M Mode in ml

Oh, J.K., J.B. Seward, A.J. Tajik. *The Echo Manual*. 2nd ed., Boston: Little, Brown and Company, (1994), 44.

SV = (LVEDV – LVESV)

where:

SV = Stroke Volume
LVEDV = End Diastolic Volume
LVEDSV = End Systolic Volume

Tricuspid Valve Area (TVA)

Reynolds, Terry. *The Echocardiographer's Pocket Reference*. 2nd ed., School of Cardiac Ultrasound, Arizona Heart Institute, (2000), 55, 391, 452.

TVA = 220 / PHT

Velocity Time Integral (VTI) in cm

Reynolds, Terry. *The Echocardiographer's Pocket Reference*. 2nd ed., School of Cardiac Ultrasound, Arizona Heart Institute, (2000), 383.

VTI = sum of abs (velocities [n])

where: Auto Trace – distance (cm) blood travels with each ejection period. Velocities are absolute values.

Obstetrical references

Amniotic Fluid Index (AFI)

Jeng, C. J., et al. “Amniotic Fluid Index Measurement with the Four Quadrant Technique During Pregnancy.” *The Journal of Reproductive Medicine*, 35:7 (July 1990), 674-677.

Average Ultrasound Age (AUA)

The system provides an AUA derived from the component measurements from the measurement tables.

Estimated Date of Delivery (EDD) by Average Ultrasound Age (AUA)

Results are displayed as month/day/year.

EDD = system date + (280 days – AUA in days)

Estimated Date of Delivery (EDD) by Last Menstrual Period (LMP)

The date entered into the patient information for LMP must precede the current date.

Results are displayed as month/day/year.

EDD = LMP date + 280 days

Estimated Fetal Weight (EFW)

Hadlock, F., et al. “Estimation of Fetal Weight with the Use of Head, Body, and Femur Measurements, A Prospective Study.” *American Journal of Obstetrics and Gynecology*, 151:3 (February 1, 1985), 333-337.

Hansmann, M., et al. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, (1986), 154.

Osaka University. *Ultrasound in Obstetrics and Gynecology*. (July 20, 1990), 103-105.

Shepard M.J., V. A. Richards, R. L. Berkowitz, et al. “An Evaluation of Two Equations for Predicting Fetal Weight by Ultrasound.” *American Journal of Obstetrics and Gynecology*, 142:1 (January 1, 1982), 47-54.

University of Tokyo, Shinozuka, N. FJSUM, et al. “Standard Values of Ultrasonographic Fetal Biometry.” *Japanese Journal of Medical Ultrasonics*, 23:12 (1996), 880, Equation 1.

Gestational Age (GA) by Last Menstrual Period (LMP)

The gestational age derived from the LMP date entered on the patient information form.

Results are displayed in weeks and days, and is calculated as follows:

GA(LMP) = System date – LMP date

Gestational Age (GA) by Last Menstrual Period (LMPd) Derived from Established Due Date (EDD)

Same as GA by EDD.

The gestational age derived from the system derived LMP using the Established Due Date entered on the patient information form.

Results are displayed in weeks and days, and is calculated as follows:

GA(LMPd) = System Date – LMPd

Last Menstrual Period Derived (LMPd) by Established Due Date (EDD)

Results are displayed as month/day/year.

LMPd(Estab. DD) = Estab. DD – 280 days

Gestational age tables

Abdominal Circumference (AC)

Hadlock, F., et al. “Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters.” *Radiology*, 152: (1984), 497-501.

Hansmann, M., et al. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, (1986), 431.

University of Tokyo, Shinozuka, N. FJSUM, et al. “Standard Values of Ultrasonographic Fetal Biometry.” *Japanese Journal of Medical Ultrasonics*, 23:12 (1996), 885.

Warning: **The gestational age calculated by your FUJIFILM SonoSite system does not match the age in the aforementioned reference at the 20.0 cm and 30.0 cm abdominal circumference (AC) measurements. The implemented algorithm extrapolates the gestational age from the slope of the curve of all table measurements, rather than decreasing the gestational age for a larger AC measurement indicated in the referenced table. This results in the gestational age always increasing with an increase in AC.**

Biparietal Diameter (BPD)

Chitty, L. S. and D.G. Altman. "New charts for ultrasound dating of pregnancy." *Ultrasound in Obstetrics and Gynecology* 10: (1997), 174-179, Table 3.

Hadlock, F., et al. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters." *Radiology*, 152: (1984), 497-501.

Hansmann, M., et al. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, (1986), 440.

Osaka University. *Ultrasound in Obstetrics and Gynecology*. (July 20, 1990), 98.

University of Tokyo, Shinozuka, N. FJSUM, et al. "Standard Values of Ultrasonographic Fetal Biometry." *Japanese Journal of Medical Ultrasonics*, 23:12 (1996), 885.

Cisterna Magna (CM)

Mahony, B.; P. Callen, R. Filly, and W. Hoddick. "The fetal cisterna magna." *Radiology*, 153: (December 1984), 773-776.

Crown Rump Length (CRL)

Hadlock, F., et al. "Fetal Crown-Rump Length: Re-evaluation of Relation to Menstrual Age (5-18 weeks) with High-Resolution, Real-Time Ultrasound." *Radiology*, 182: (February 1992), 501-505.

Hansmann, M., et al. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, (1986), 439.

Osaka University. *Ultrasound in Obstetrics and Gynecology*. (July 20, 1990), 20 and 96.

Tokyo University. "Gestational Weeks and Computation Methods." *Ultrasound Imaging Diagnostics*, 12:1 (1982-1), 24-25, Table 3.

Femur Length (FL)

Chitty, L. S. and D.G. Altman. “New charts for ultrasound dating of pregnancy.” *Ultrasound in Obstetrics and Gynecology* 10: (1997), 174-179, Table 8, 186.

Hadlock, F., et al. “Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters.” *Radiology*, 152: (1984), 497-501.

Hansmann, M., et al. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, (1986), 431.

Osaka University. *Ultrasound in Obstetrics and Gynecology*. (July 20, 1990), 101-102.

University of Tokyo, Shinozuka, N. FJSUM, et al. “Standard Values of Ultrasonographic Fetal Biometry.” *Japanese Journal of Medical Ultrasonics*, 23:12 (1996), 886.

Fetal Trunk Cross-Sectional Area (FTA)

Osaka University. *Ultrasound in Obstetrics and Gynecology*. (July 20, 1990), 99-100.

Gestational Sac (GS)

Hansmann, M., et al. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, (1986).

Nyberg, D.A., et al. “Transvaginal Ultrasound.” *Mosby Yearbook*, (1992), 76.

Gestational sac measurements provide a fetal age based on the mean of one, two, or three distance measurements; however, Nyberg’s gestational age equation requires all three distance measurements for an accurate estimate.

Tokyo University. “Gestational Weeks and Computation Methods.” *Ultrasound Imaging Diagnostics*, 12:1 (1982-1).

Head Circumference (HC)

Chitty, L. S. and D.G. Altman. “New charts for ultrasound dating of pregnancy.” *Ultrasound in Obstetrics and Gynecology* 10: (1997), 174-191, Table 5, 182.

Hadlock, F., et al. “Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters.” *Radiology*, 152: (1984), 497-501.

Hansmann, M., et al. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, (1986), 431.

Humerus (HL)

Jeanty, P.; F. Rodesch; D. Delbeke; J. E. Dumont. "Estimate of Gestational Age from Measurements of Fetal Long Bones." *Journal of Ultrasound in Medicine*. 3: (February 1984), 75-79

Occipito-Frontal Diameter (OFD)

Hansmann, M., et al. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, (1986), 431.

Tibia

Jeanty, P.; F. Rodesch; D. Delbeke; J. E. Dumont. "Estimate of Gestational Age from Measurements of Fetal Long Bones." *Journal of Ultrasound in Medicine*. 3: (February 1984), 75-79.

Transverse Trunk Diameter (TTD)

Hansmann, M., et al. *Ultrasound Diagnosis in Obstetrics and Gynecology*. New York: Springer-Verlag, (1986), 431.

Growth analysis tables

Abdominal Circumference (AC)

Chitty, Lyn S. et al. "Charts of Fetal Size: 3. Abdominal Measurements." *British Journal of Obstetrics and Gynaecology* 101: (February 1994), 131, Appendix: AC-Derived.

Hadlock, F., et al. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters." *Radiology*, 152: (1984), 497-501.

Jeanty P., E. Cousaert, and F. Cantraine. "Normal Growth of the Abdominal Perimeter." *American Journal of Perinatology*, 1: (January 1984), 129-135.

(Also published in Hansmann, Hackeloer, Staudach, Wittman. *Ultrasound Diagnosis in Obstetrics and Gynecology*. Springer-Verlag, New York, (1986), 179, Table 7.13.)

Biparietal Diameter (BPD)

Chitty, Lyn S. et al. “Charts of Fetal Size: 2. Head Measurements.” *British Journal of Obstetrics and Gynaecology* 101: (January 1994), 43, Appendix: BPD-Outer-Inner.

Hadlock, F., et al. “Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters.” *Radiology*, 152: (1984), 497-501.

Jeanty P., E. Cousaert, and F. Cantraine. “A Longitudinal Study of Fetal Limb Growth.” *American Journal of Perinatology*, 1: (January 1984), 136-144, Table 5.

(Also published in Hansmann, Hackeloer, Staudach, Wittman. *Ultrasound Diagnosis in Obstetrics and Gynecology*. Springer-Verlag, New York, (1986), 176, Table 7.8.)

Estimated Fetal Weight (EFW)

Brenner, William E.; D. A. Edelman; C. H. Hendricks. “A standard of fetal growth for the United States of America,” *American Journal of Obstetrics and Gynecology*, 126: 5 (November 1, 1976), 555-564; Table II.

Hadlock F., et al. “In Utero Analysis of Fetal Growth: A Sonographic Weight Standard.” *Radiology*, 181: (1991), 129-133.

Jeanty, Philippe, F. Cantraine, R. Romero, E. Cousaert, and J. Hobbins. “A Longitudinal Study of Fetal Weight Growth.” *Journal of Ultrasound in Medicine*, 3: (July 1984), 321-328, Table 1.

(Also published in Hansmann, Hackeloer, Staudach, and Wittman. *Ultrasound Diagnosis in Obstetrics and Gynecology*. Springer-Verlag, New York, (1986), 186, Table 7.20.)

Femur Length (FL)

Chitty, Lyn S. et al. “Charts of Fetal Size: 4. Femur Length.” *British Journal of Obstetrics and Gynaecology* 101: (February 1994), 135.

Hadlock, F., et al. “Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters.” *Radiology*, 152: (1984), 497-501.

Jeanty P, E. Cousaert, and F. Cantraine. “A Longitudinal Study of Fetal Limb Growth.” *American Journal of Perinatology*, 1: (January 1984), 136-144, Table 5.

(Also published in Hansmann, Hackeloer, Staudach, Wittman. *Ultrasound Diagnosis in Obstetrics and Gynecology*. Springer-Verlag, New York, (1986), 182, Table 7.17.)

Head Circumference (HC)

Chitty, Lyn S., et al. "Charts of Fetal Size: 2. Head Measurements." *British Journal of Obstetrics and Gynaecology* 101: (January 1994), 43, Appendix: HC-Derived.

Hadlock, F., et al. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters." *Radiology*, 152: (1984), 497-501.

Jeanty P, E. Cousaert, and F. Cantraine. "A longitudinal study of Fetal Head Biometry." *American J of Perinatology*, 1: (January 1984), 118-128, Table 3.

(Also published in Hansmann, Hackeloer, Staudach, Wittman. *Ultrasound Diagnosis in Obstetrics and Gynecology*. Springer-Verlag, New York, (1986), 176, Table 7.8.)

Head Circumference (HC)/Abdominal Circumference (AC)

Campbell S., Thoms Alison. "Ultrasound Measurements of the Fetal Head to Abdomen Circumference Ratio in the Assessment of Growth Retardation," *British Journal of Obstetrics and Gynaecology*, 84: (March 1977), 165-174.

Ratio calculations

FL/AC Ratio

Hadlock F.P., R. L. Deter, R. B. Harrist, E. Roecker, and S.K. Park. "A Date Independent Predictor of Intrauterine Growth Retardation: Femur Length/Abdominal Circumference Ratio," *American Journal of Roentgenology*, 141: (November 1983), 979-984.

FL/BPD Ratio

Hohler, C.W., and T.A. Quetel. "Comparison of Ultrasound Femur Length and Biparietal Diameter in Late Pregnancy," *American Journal of Obstetrics and Gynecology*, 141:7 (Dec. 1 1981), 759-762.

FL/HC Ratio

Hadlock F.P., R. B. Harrist, Y. Shah, and S. K. Park. "The Femur Length/Head Circumference Relation in Obstetric Sonography." *Journal of Ultrasound in Medicine*, 3: (October 1984), 439-442.

HC/AC Ratio

Campbell S., Thoms Alison. “Ultrasound Measurements of the Fetal Head to Abdomen Circumference Ratio in the Assessment of Growth Retardation,” *British Journal of Obstetrics and Gynaecology*, 84: (March 1977), 165-174.

General references

+/x or S/D Ratio

+/x = abs (Velocity A/Velocity B)

where:

A = velocity cursor +
B = velocity cursor x

Acceleration Index (ACC)

Zwiebel, W.J. *Introduction to Vascular Ultrasonography*, 4th ed., W.B. Saunders Company, (2000), 52.

ACC = abs (delta velocity/delta time)

Elapsed Time (ET)

ET = time between velocity cursors in milliseconds

Hip Angle/d:D Ratio

Graf, R. “Fundamentals of Sonographic Diagnosis of Infant Hip Dysplasia.” *Journal of Pediatric Orthopedics*, Vol. 4, No. 6: 735-740, 1984.

Morin, C., Harcke, H., MacEwen, G. “The Infant Hip: Real-Time US Assessment of Acetabular Development.” *Radiology* 177: 673-677, December 1985.

Percent Area Reduction

Taylor K.J.W., P.N. Burns, P. Breslau. *Clinical Applications of Doppler Ultrasound*, Raven Press, N.Y., (1988), 130-136.

Zwiebel W.J., J.A. Zagzebski, A.B. Crummy, et al. “Correlation of peak Doppler frequency with lumen narrowing in carotid stenosis.” *Stroke*, 3: (1982), 386-391.

% Area Reduction = (1 - A2(cm^2)/A1(cm^2)) * 100

where:

A1 = original area of the vessel in square cm
A2 = reduced area of the vessel in square cm

Percent Diameter Reduction

Handa, Nobuo et al., “Echo-Doppler Velocimeter in the Diagnosis of Hypertensive Patients: The Renal Artery Doppler Technique,” *Ultrasound in Medicine and Biology*, 12:12 (1986), 945-952.

% Diameter Reduction = (1 - D2(cm)/D1(cm)) * 100

where:

D1 = original diameter of the vessel in cm
D2 = reduced diameter of the vessel in cm

Pressure Gradient (PGr) in mmHG

Oh, J.K., J.B. Seward, A.J. Tajik. T*he Echo Manual.* 2nd ed., Lippincott, Williams, and Wilkins, (1999), 64.

4 * $(Velocity)^2$

Peak E Pressure Gradient (E PG)

E PG = 4 * PE^2

Peak A Pressure Gradient (A PG)

A PG = 4 * PA2

Peak Pressure Gradient (PGmax)

PGmax = 4 * PV2

Mean Pressure Gradient (PGmean)

PGmean = 4 * $Vmax^2$

Pulsatility Index (PI)

Kurtz, A.B., W.D. Middleton. *Ultrasound-the Requisites*. Mosby Year Book, Inc., (1996), 469.

PI = (PSV – EDV)/V

where:

PSV = peak systolic velocity
EDV = end diastolic velocity
V = mean flow velocity throughout the entire cardiac cycle

Resistive Index (RI)

Kurtz, A.B., W.D. Middleton. *Ultrasound-the Requisites*. Mosby Year Book, Inc., (1996), 467.

RI = abs ((Velocity A – Velocity B)/Velocity A) in measurements

where:

A = velocity cursor +
B = velocity cursor x

Time Averaged Mean (TAM) in cm/s

TAM = mean (mean Trace)

Time Averaged Peak (TAP) in cm/s

TAP = peak (peak Trace)

Volume (Vol)

Beyer, W.H. *Standard Mathematical Tables*, 28th ed., CRC Press, Boca Raton, FL, (1987), 131.

Volume Bladder

Dicuio, M., et.al. "Measurements of urinary bladder volume: comparison of five ultrasound calculation methods in volunteers." *Arch. Ital. Urol Androl,*(2005) Mar:77(1):60-2 .

Volume Flow (VF) in ml/m

Allan, Paul L. et al. *Clinical Doppler Ultrasound*, 4th ed., Harcourt Publishers Limited. (2000), 36-38.

One of the following, depending on the Live Trace setting:

VF = CSA * TAM * .06

VF = CSA * TAP * .06

Volume Follicle

Raine-Fenning, N. et al. *Ultrasound in Obstetrics & Gynecology* (2008), Volume 31, Issue 6, John Wiley & Sons, Ltd., 691–696.

Volume Ovarian

Balen, A.H., Laven, J.S., Tan, S.L, Dewailly, D. "Ultrasound assessment of the polycystic ovary: international consensus definitions." *Human Reproduction Update*, (2003), Vol.9, No.6 pp. 505-514.

Volume Uterine

Wiener, J. J. and Newcombe, R. G. "Measurements of uterine volume: a comparison between measurements by ultrasonography and by water displacement." *J. Clin. Ultrasound,* (1992) 20 (7), 457–460.

Worksheets and reports

The system collects patient information, calculation results, and worksheet findings into a *patient report*. You can view and edit the report preview and worksheets at any time until the exam has ended. After the exam has ended, you can view the patient report (see "Displaying reports and worksheets after the exam has ended" on page 292).

The value for a calculation appears in the report only if the calculation is saved. The pound symbol (#) indicates a value that is out of range (for example, too large or small). Calculation values that are out of range are not included in derived calculations (for example, mean). Calculations appear in the order that they were saved.

When you archive or export the exam, the report is included in the exam.

If they are licensed on your system, Acute Care worksheets and MSK worksheets are available. See "Acute Care and MSK worksheets" on page 289.

Report preview

To display the report preview

1 Tap **WORKSHEETS**.

2 (Arterial or Cardiac exam) Tap **Summary** or **Calculations** in the **Report Preview** list. The mean of the detail entries is used in the summary.

You can switch between these views as needed.

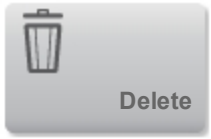
To exit the report preview and return to imaging, tap **Done**.

To delete calculation values from the report preview

1 Display the report preview.

2 (Arterial or Cardiac exam) Tap **Calculations**.

3 Select the value, and then tap **Delete**.



Deleting some measurements also deletes related measurements. Deleted measurements are not included in the summary information.

Arterial and cardiac reports

(Arterial) To modify the ICA/CCA ratio

1 Display the arterial report preview.

2 Tap **Summary**.

3 Select measurements for the ICA/CCA ratio for both the right and left sides from the **Ratio** list.

(Cardiac) To adjust the RA pressure

1 Display the cardiac report preview.

2 Tap **Summary**.

3 Select the desired value from the RA list.

Changing the RA pressure from the default value of 5 MmHG affects the RVSP calculation result.

Obstetrics reports

The Obstetrics calcs reports have a space for signing printed reports.

To display the Obstetrics Twins report preview

♦ In the Obstetrics report preview, do one of the following:

- To display an individual twin report preview, tap **Twin A** or **Twin B**.
- To display both twins in one report preview, tap **Compare**.

To fill out the Obstetrics anatomy checklist

You can document reviewed anatomy.

1 In the Obstetrics report preview, tap **Anatomy Checklist**.

2 Do any of the following:

- Select the check boxes.
- Enter the **Fetal Lie**.
- Enter the **Plac Location** and select the grading method (**0**, **I**, **II**, or **III**) from the corresponding list.
- Select a **Gender**.

To complete the Obstetrics biophysical profile

♦ In the Obstetrics report preview, select values under **Biophysical Profile**.

The total is calculated when values are selected. NST (non-stress test) is optional.

Obstetrics graphs

You can display Obstetrics graphs if the **LMP** or **EDD** text boxes are filled in the patient form, and if a Growth Analysis author has been selected for the measurement (see "Obstetrics calculations settings " on page 41).

To display Obstetrics graphs

1 Tap **WORKSHEETS**.

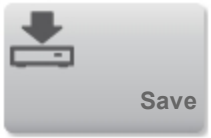
2 Tap **Graphs**.

3 In the **Graphs** list, select the desired measurement and author.

The graph for the selected measurement appears.

For twins, both measurement sets are plotted on the same graph.

4 (Optional) Tap **Save** to save the current graph page as an image that you can review as part of the exam. (See "Reviewing" on page 294.)



5 (Optional) Tap **Print Page** to print the current graph page.

Tap **Done** to return to live imaging.

Acute Care and MSK worksheets

Acute Care and MSK (Musculoskeletal) worksheets are licensed features that include patient information, text boxes, and procedure information from the ultrasound system. Acute Care

worksheets include results from measurements and calculations you perform from the Acute Care calculation lists.

To display an Acute Care or MSK worksheet

1 Tap **WORKSHEETS**.

2 Tap **Acute Care Worksheets** or **MSK Worksheets**.

3 Tap a worksheet in the list.

To exit the worksheet and return to imaging, tap **Done**.

To edit an Acute Care or MSK worksheet

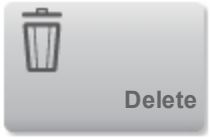
You can edit worksheets on the system until the exam has ended.

1 Enter information in the worksheet:

- **Indications**
  - (Acute Care worksheets) Select multiple indications, or select **Other Indications** to enter additional information.
  - (MSK worksheets) Enter indications in the Indications text box.
- (Acute Care worksheets only) **Views** Select options to reflect the views obtained. Select **Other Views** to enter additional information.
- (Acute Care worksheets only) **Findings** You can make multiple selections in the Findings section. Select **Other Findings** to enter additional information.

- (Acute Care worksheets only) **Interpretation** You can make multiple selections in the Interpretation section. Select **Other Interpretations** to enter additional information.
- (MSK worksheets only) **Procedure Details and Conclusions**. You can make multiple selections in the Procedure Details and Conclusions section. Enter comments in the **Comments** text box.

2 (Acute Care worksheets only) To delete a calculation value, select the value and then tap **Delete**.



3 Tap **Done**.

Printing reports and worksheets

You can print the current page of a report preview or worksheet or the entire report preview or worksheet.

To print a report preview or worksheet

1 Display the report preview or worksheet.

2 Do one of the following:

- To print the entire report preview or worksheet, tap **Print All**.

- To print the current page, tap **Print Page.**

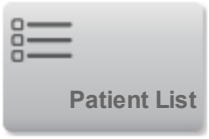
Displaying reports and worksheets after the exam has ended

When you end an exam, the system saves the *patient report* with all measurements and calculations performed during the exam, including Acute Care or MSK worksheet data, if available.

To display the report after the exam has ended

1 Tap **REVIEW**.

2 Tap **Patient List**.



3 Select an exam.

4 Tap **Thumbnails**.

5 Tap **Report**.

The system displays the read-only report and any associated worksheets

6 Tap **Done** to return to the patient list.

Related topics

Reviewing 294
DICOM 87
Entering patient information 76
Printing images 301
Acute Care calculations 259
Cardiac calculations 225
Obstetrics calculations 250
Archiving and exporting 303

Reviewing

You can review images and video clips from both current and completed exams.

Caution: If the save available icon

does not appear in the system status area, internal storage may be defective. Contact FUJIFILM SonoSite Technical Support. (See "Getting help" on page 3.)

Patient list

The patient list organizes saved images and video clips in patient exams. You can sort the patient list, view and delete exams, edit patient information, and append images and video clips to an existing exam.

From the patient list, you can also export exams to a USB memory stick, select a routing selection to associate with an exam, or archive exams to a DICOM archive server. See Related Topics.

Column headings in the patient list indicate:

- **Name** Patient name
- **ID** Patient ID
- **Date/Time** The date and time of the exam
- The user who performed the exam
- The number of images and video clips saved with the exam
- The archive status of the exam
- The export status of the exam

To display the patient list

1 Do one of the following:

- Tap **REVIEW** and then tap **Patient List**.

- Tap **Patient**, and then tap **Patient List**.

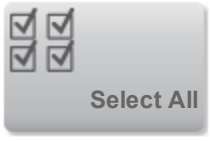
To sort the patient list

By default, the patient list is sorted by date and time, with the most recent patient listed first. You can re-sort the patient list.

♦ Tap the column heading that you want to sort by. Tap it again to sort in reverse order.

To select all exams in the patient list

♦ Tap **Select All**.

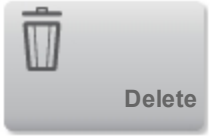


To deselect all exams, tap **Clear All**.

To delete an exam

1 In the patient list, select the check box next to one or more exams.

2 Tap **Delete**.



To view exam information

1 Tap the exam in the patient list.

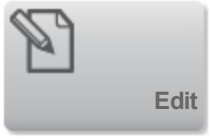
2 Tap **Info**.

To edit patient information from the patient list

You can edit patient information from the patient list instead of from the patient form if the exam is ended but has not been exported or archived.

1 Tap the exam in the patient list.

2 Tap **Edit**.



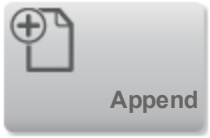
3 Fill in the text boxes, and tap **Done**.

To append images and video clips to a patient exam

Although you cannot add images and video clips to a patient exam that is ended, you can automatically start a new patient exam that has the same patient information. Depending on your archiver, the two exams appear as one study when exported or archived.

1 Tap the exam in the patient list.

2 Tap **Append**.



A new patient form appears. The form has the same information as the exam you selected.

Reviewing images and video clips

You can review images and video clips in only one patient exam at a time. The system displays images and video clips in the order in which they were saved.

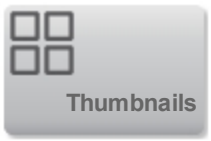
Video clips play automatically after loading. The load time depends on video clip length.

To review images and video clips

1 Tap **REVIEW**, and then do either of the following:

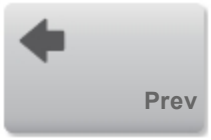
- Review the current exam.

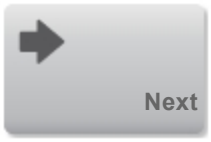
- Review a completed exam: Tap **Patient List**. In the patient list, tap the exam, and then tap **Thumbnails**.



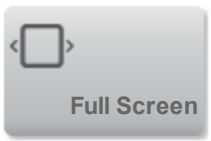
2 Do any of the following:

- To view the previous or next image or video clip, tap **Prev** or **Next** .

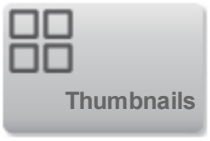




- To view images or video clips full-screen, tap **Full Screen**. Swipe left or right to view the previous or next item.



To return to multi-image display, tap **Thumbnails**.

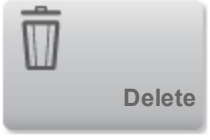


3 (Video clips only) Do any of the following:

- To pause the video clip, tap .
- To play the video clip, tap .
- To select a playback speed, tap .
- To move forward through frames one at a time, tap .
- To move backward through frames one at a time, tap .

4 (Optional) Do any of the following:

- Label an image or a frame from a video clip. (See "Labeling during review" on page 198.)
- View the report. (See "Worksheets and reports" on page 286.)
- Delete an image or video clip: select the image or video clip, and then tap **Delete**.



5 Return to the patient list by tapping **Patient List**, or return to imaging by tapping **Done** .

Related topics

Labeling images....194
Worksheets and reports....286
Archiving and exporting....303
Routing selections....106
Printing images....301
Saving images and video clips....178

Printing images

For information about printing worksheets and reports or about DICOM printing, see Related topics.

To print while imaging

1 Make sure that the power button on the printer is in the On position.

2 With the image displayed, tap **Print**.

Note: You can also configure the footswitch to print (see "User profile settings" on page 64).

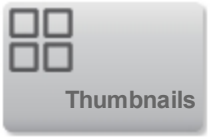
To print a saved image from a current or ended exam

1 Make sure that the power button on the printer is in the On position.

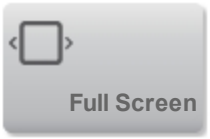
2 Tap **REVIEW**.

3 Do one of the following:

- Select the check box for an image from a current exam.
- Select an image from an ended exam: Tap **Patient List**, tap the exam, tap **Thumbnails**, and then select the check box for an image.



4 Tap **Full Screen**.



5 Tap **Print**.

Related topics

Archiving and exporting 303
Reviewing 294
Worksheets and reports 286

Archiving and exporting

The patient list organizes saved images and video clips in patient exams.

You can *archive* exams from the patient list to a DICOM archive server or print them to a DICOM printer. You can *export* exams to a USB memory stick.

Archiving exams

If you have configured the system for DICOM transfer, the system automatically archives saved images and video clips, along with the patient report, to DICOM devices. If you have configured the system to connect to a DICOM printer, exams are also printed when they are archived.

The system archives images and video clips either during the exam or at the end of the exam, depending on the settings you have chosen in the **Transfer Images** setting on the **Location** configuration page. (Exams are printed only at the end of an exam.)

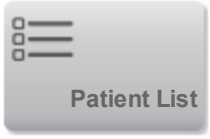
You can also manually archive exams.

The Archive in Progress icon is animated when patient exams are archiving. Pending exams are archived starting at the top of the patient list.

To verify that exams transferred

1 Tap **REVIEW**.

2 Tap **Patient List**.



The column shows the status of exam transfer.

- Patient exam is archived.
- Patient exam is archive suspended. Network connection settings may be wrong (see "Connecting to the network " on page 88), or there may be a network or server problem. The exam needs to be manually archived (see "To manually archive exams" on page 305).
- Storage commitment was successful.
- Storage commitment for this exam is suspended.

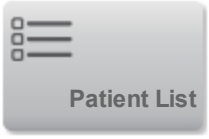
Exams with no status markers are pending archiving.

To display information about an exam

You can display information about an exam, including transfer details.

1 Tap **REVIEW**.

2 Tap **Patient List**.



3 In the patient list, select the exam.

4 Tap **Info**.

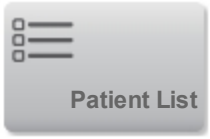
To manually archive exams

1 Verify the following:

- The correct location is selected. (See "Connectivity settings" on page 51.)
- If the system is connected to a network via an Ethernet connection, the LAN link light (green LED) next to the Ethernet connector is on.
- For a wireless connection, the wireless connected icon appears in the system status area on the clinical monitor.

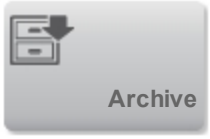
2 Tap **REVIEW**.

3 Tap **Patient List**.



4 Select the check box next to one or more exams.

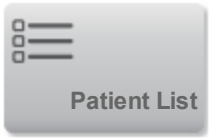
5 Tap **Archive**. (The system removes any status markers.)



To manually request storage commitment

1 Tap **REVIEW**.

2 Tap **Patient List** .



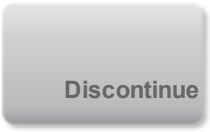
3 Select the check box next to one or more exams.

4 Tap **SCommit**.

To discontinue MPPS for an exam

You can discontinue MPPS for an exam before completing the exam.

♦ On the patient form, tap **Discontinue**.



Exporting exams

Caution: To avoid losing data from or damaging the USB memory stick, do not remove the USB memory stick or turn off the ultrasound system while exporting. In addition, do not bump or apply pressure to the USB memory stick while it is connected to the system. The connector could break.

You can export patient exams if they are ended and if the system administrator has not disabled USB export (See "Ending the exam" on page 85 and "Administration settings" on page 31.) Exams include images, video clips, and the patient report.

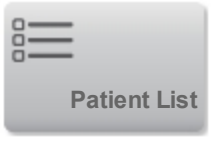
A USB memory stick is for temporary storage of images and clips. Archive patient exams regularly.

To export patient exams manually to a USB memory stick

1 Specify the file format for exported images. (See "USB settings" on page 70.)

2 Tap **REVIEW**.

3 Tap **Patient List**.



4 Connect a USB memory stick (see "USB devices" on page 23).

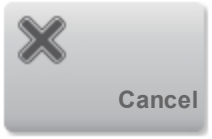
5 In the patient list, select the check box next to one or more exams.

6 Tap **Export USB**. A list of USB devices appears.

7 Select the USB memory stick. If you want to hide patient information, deselect **Include patient information on images and video clips**.

8 Tap **Export**.

The files are finished exporting approximately five seconds after the USB animation stops. Removing the USB memory stick or turning off the system while exporting may cause exported files to be corrupted or incomplete. To stop in-progress exporting, tap **Cancel**.



The column of the patient list indicates whether the system has exported the exam.

To export patient exams automatically to a USB memory stick

1 Make sure that automatic export is enabled. See "To specify export options " on page 70.

2 Insert a USB memory stick into a USB port on the side of the system.

3 End the exam.

Related topics

USB settings 70
DICOM 87
Printing images 301
Reviewing 294
Worksheets and reports 286
Saving images and video clips 178

DVR recording

You can record video displayed on the clinical monitor to a USB memory stick inserted into the DVR USB port. Clips save as MP4 files. You can copy the recordings to another device.

You cannot record video if the system administrator has selected **Disable USB Export** in Administration setups. (See "Administration settings" on page 31.)

To record to the DVR

1 Make sure that a USB memory stick is inserted into the DVR USB port.

The DVR USB port is located on the rear of the stand's dock and is labeled DVR Only. See "Ports " on page 12.

2 Tap **Rec** at the upper right of the touch panel.

Note: You can also configure the footswitch to record (see "User profile settings" on page 64).

The system begins recording to the USB memory stick in the DVR port and displays a flashing recording indicator .

Note: If **Rec** *is not available, check to make sure that the DVR has a USB memory stick inserted and that the USB memory stick is not full.*

3 To stop recording, tap **Rec**, or end the exam.

To copy DVR recordings to another device

1 After you stop recording, remove the USB memory stick from the DVR.

2 Insert the USB memory stick into another device (for example, a personal computer).

3 Display the USB memory stick's contents and copy the recordings (MP4 files) to the device.

ECG

ECG monitoring requires an optional FUJIFILM SonoSite ECG module.

ECG is available only on the cardiac exam type on the P21xp transducer.

Warning: To prevent misdiagnosis, do not use the ECG trace to diagnose cardiac rhythms. The FUJIFILM SonoSite ECG option is a non-diagnostic feature.

Warning: To avoid electrical interference with aircraft systems, do not use the ECG cable on aircraft. Such interference may have safety consequences.

Caution: Use only accessories recommended by FUJIFILM SonoSite with the system. Connecting an accessory not recommended by FUJIFILM SonoSite can damage the system.

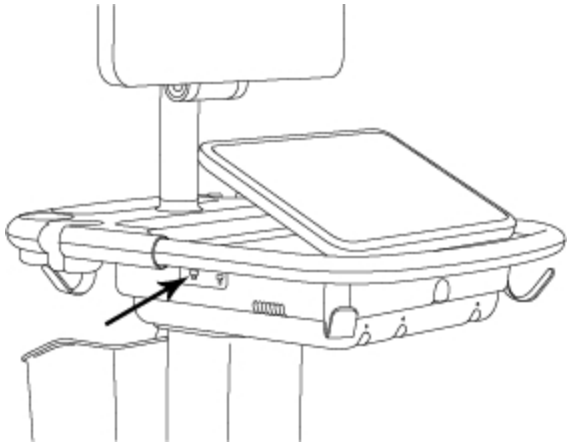
To monitor ECG

1 Select the cardiac exam type on the P21xp transducer. (See "Selecting a transducer and exam type" on page 20.)

2 Connect the ECG cable to the ECG port (ECG) on the ultrasound system.

ECG monitoring turns on automatically.

Note: The ECG signal may take up to one minute to restabilize after defibrillator use on a patient.



ECG port

3 Tap **ECG**.

If this control is hidden, tapping **More Controls** displays it.

4 Do any of the following in the **ECG Settings** window:

- To display the ECG trace, select **Show**.
- To adjust the value of the ECG gain, drag the **Gain** slider.
- To set the ECG scroll speed, select **Slow**, **Medium**, or **Fast** under **Sweep Speed**.

  Note: If the Doppler or M Mode trace is active, the ECG scroll speed matches the sweep speed for the trace.

- To move the ECG trace up or down vertically on the image, tap **Up** or **Down** under **Position**.

5 Tap **Done**.

Done

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